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ANALYSIS

OF

ARISTOTLE'S LOGIC,

WITH REMARKS.

BY

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ADVERTISEMENT.

THE following Analyſis of Ariſtotle's Logic has been hitherto known to the Public only as an Appendix to one of Lord Kames's Sketches of the Hiſtory of Man. The high eſtimation in which it has been long held by the beſt Judges in both parts of this Iſland, has induced the Editor (in whom the Copy Right of Lord Kames's Philoſophical Works is veſted) to detach it from the voluminous Publication of which it originally formed a part, and to print it in a ſeparate Tract, for the uſe of Academical Students. In doing ſo, he has the ſatisfaction of complying with the wiſhes of ſome of the moſt eminent Profeſſors in the Scottiſh Univerſities, who have repeatedly urged him to give a more general circulation to a performance of ſuch acknowledged merit and utility.

W. C.

REID'S ANALYSIS

OF

ARISTOTLE'S LOGIC.

CHAP. I.

OF THE FIRST THREE TREATISES.

SECT. I.

OF THE AUTHOR.

ARISTOTLE had very uncommon advantages; born in an age when the philoſophical ſpirit in Greece had long flouriſhed, and was in its greateſt vigour; brought up in the court of Macedon, where his father was the king's phyſician; twenty years a favourite ſcholar of Plato, and tutor to Alexander the Great, who both honoured him with his friendſhip, and ſupplied him

with every thing neceſſary for the proſecution of his inquiries.

Theſe advantages he improved by indefatigable ſtudy and immenſe reading. He was the firſt we know, ſays Strabo, who compoſed a library. And in this the Egyptian and Pergamenian kings copied his example. As to his genius, it would be diſreſpectful to mankind not to allow an uncommon ſhare to a man who governed the opinions of the moſt enlightened part of the ſpecies near two thouſand years.

If his talents had been laid out ſolely for the diſcovery of truth, and the good of mankind, his laurels would have remained for ever freſh: but he ſeems to have had a greater paſſion for fame than for truth, and to have wanted rather to be admired as the prince of philoſophers than to be uſeful: ſo that it is dubious whether there be in his character moſt of the philoſopher or of the ſophiſt. The opinion of Lord Bacon is not without probability, That his ambition was as boundleſs as that of his royal pupil;

the one aſpiring at univerſal monarchy over the bodies and fortunes of men, the other over their opinions. If this was the caſe, it cannot be ſaid that the philoſopher purſued his aim with leſs induſtry, leſs ability, or leſs ſucceſs, than the hero.

His writings carry too evident marks of that philoſophical pride, vanity, and envy, which have often ſullied the character of the learned. He determines boldly things above all human knowledge; and enters upon the moſt difficult queſtions, as his pupil entered upon a battle, with full aſſurance of ſucceſs. He delivers his deciſions oracularly, and without any fear of miſtake. Rather than confeſs his ignorance, he hides it under hard words and ambiguous expreſſions, of which his interpreters can make what they pleaſe. There is even reaſon to ſuſpect that he wrote often with affected obſcurity, either that the air of myſtery might procure great veneration, or that his books might be underſtood only

by the adepts who had been initiated in his philoſophy.

His conduct towards the writers that went before him has been much cenſured. After the manner of the Ottoman princes, ſays Lord Verulam, he thought his throne could not be ſecure unleſs he killed all his brethren. Ludovicus Vives charges him with detracting from all philoſophers, that he might derive that glory to himſelf of which he robbed them. He rarely quotes an author but with a view to cenſure, and is not very fair in repreſenting the opinions which he cenſures.

The faults we have mentioned are ſuch as might be expected in a man who had the daring ambition to be tranſmitted to all future ages as the prince of philoſophers, as one who had carried every branch of human knowledge to its utmoſt limit; and who was not very ſcrupulous about the means he took to obtain his end.

We ought, however, to do him the juſtice to obſerve, that although the pride

and vanity of the ſophiſt appear too much in his writings in abſtract philoſophy, yet, in natural hiſtory, the fidelity of his narrations ſeems to be equal to his induſtry; and he always diſtinguiſhes between what he knew and what he had by report. And, even in abſtract philoſophy, it would be unfair to impute to Ariſtotle all the faults, all the obſcurities, and all the contradictions, that are to be found in his writings. The greateſt part, and perhaps the beſt part, of his writings is loſt. There is reaſon to doubt whether ſome of thoſe we aſcribe to him be really his, and whether what are his be not much vitiated and interpolated. Theſe ſuſpicions are juſtified by the fate of Ariſtotle's writings, which is judiciouſly related, from the beſt authorities, in Bayle's dictionary, under the article *Tyrannion*, to which I refer.

His books on logic, which remain, are, 1. One book of the Categories. 2. One of Interpretation. 3. Firſt Analytics, two books. 4. Laſt Analytics, two books. 5.

Topics, eight books. 6. Of Sophiſms, one book. Diogenes Laertius mentions many others that are loſt. Thoſe I have mentioned have commonly been publiſhed together under the name of *Ariſtotle's Organon*, or *his Logic*; and, for many ages, Porphyry's Introduction to the Categories has been prefixed to them.

SECT. II.

OF PORPHYRY'S INTRODUCTION.

In this introduction, which is addreſſed to Chryſoarius, the author obſerves, That in order to underſtand Ariſtotle's doctrine concerning the Categories, it is neceſſary to know what a *genus* is, what a *ſpecies*, what a *ſpecific difference*, what a *property*, and what an *accident*; that the knowledge of theſe is alſo very uſeful in definition, in diviſion, and even in demonſtration: there-

fore he propoſes, in this little tract, to deliver ſhortly and ſimply the doctrine of the ancients, and chiefly of the Peripatetics, concerning theſe five *predicables;* avoiding the more intricate queſtions concerning them; ſuch as, Whether *genera* and *ſpecies* do really exiſt in nature? or, Whether they are only conceptions of the human mind? If they exiſt in nature, Whether they are corporeal or incorporeal? and, Whether they are inherent in the objects of ſenſe, or disjoined from them? Theſe, he ſays, are very difficult queſtions, and require accurate diſcuſſion; but that he is not to meddle with them.

After this preface, he explains very minutely each of the five words above-mentioned, divides and ſubdivides each of them, and then purſues all the agreements and differences between one and another through ſixteen chapters.

SECT. III.

OF THE CATEGORIES.

THE book begins with an explication of what is meant by univocal words, what by equivocal, and what by denominative. Then it is obſerved, that what we ſay is either ſimple, without compoſition or ſtructure, as *man*, *horſe*; or it has compoſition and ſtructure, as, *a man fights*, *the horſe runs*. Next comes a diſtinction between a ſubject of predication; that is, a ſubject of which any thing is affirmed or denied, and a ſubject of inheſion. Theſe things are ſaid to be inherent in a ſubject, which, although they are not a part of the ſubject, cannot poſſibly exiſt without it, as figure in the thing figured. Of things that are, ſays Ariſtotle, ſome may be predicated of a ſubject, but are in no ſubject; as *man* may be predicated of James or John, but is not in any ſubject. Some, again, are in a ſubject, but can be predicated

of no ſubject. Thus, my knowledge in grammar is in me as its ſubject, but it can be predicated of no ſubject; becauſe it is an individual thing. Some are both in a ſubject, and may be predicated of a ſubject, as ſcience, which is in the mind as its ſubject, and may be predicated of geometry. Laſtly, ſome things can neither be in a ſubject, nor be predicated of any ſubject. Such are all individual ſubſtances, which cannot be predicated, becauſe they are individuals; and cannot be in a ſubject, becauſe they are ſubſtances. After ſome other ſubtleties about predicates and ſubjects, we come to the Categories themſelves; the things above-mentioned being called by the ſchoolmen the *ante-prædicamenta*. It may be obſerved, however, that, notwithſtanding the diſtinction now explained, the *being a ſubject*, and the *being predicated truly of a ſubject*, are, in the Analytics, uſed as ſynonymous phraſes; and this variation of ſtyle has led ſome perſons to think that

the Categories were not written by Ariſtotle.

Things that may be expreſſed without compoſition or ſtructure are, ſays the author, reducible to the following heads: They are either *ſubſtance*, or *quantity*, or *quality*, or *relatives*, or *place*, or *time*, or *having*, or *doing*, or *ſuffering*. Theſe are the predicaments or categories. The firſt four are largely treated of in four chapters; the others are ſlightly paſſed over, as ſufficiently clear of themſelves. As a ſpecimen, I ſhall give a ſummary of what he ſays on the category of ſubſtance.

Subſtances are either primary, to wit, individual ſubſtances, or ſecondary, to wit, the genera and ſpecies of ſubſtances. Primary ſubſtances neither are in a ſubject, nor can be predicated of a ſubject; but all other things that exiſt either are in primary ſubſtances, or may be predicated of them. For whatever can be predicated of that which is in a ſubject may alſo be predicated of the ſubject itſelf. Primary ſub-

ſtances are more ſubſtances than the ſecondary; and of the ſecondary, the ſpecies is more a ſubſtance than the genus. If there were no primary, there could be no ſecondary ſubſtances.

The properties of ſubſtance are theſe: 1. No ſubſtance is capable of intention or remiſſion. 2. No ſubſtance can be in any other thing as its ſubject of inheſion. 3. No ſubſtance has a contrary; for one ſubſtance cannot be contrary to another; nor can there be contrariety between a ſubſtance and that which is no ſubſtance. 4. The moſt remarkable property of ſubſtance is, that one and the ſame ſubſtance may, by ſome change in itſelf, become the ſubject of things that are contrary. Thus, the ſame body may be at one time hot, at another cold.

Let this ſerve as a ſpecimen of Ariſtotle's manner of treating the Categories. After them, we have ſome chapters, which the ſchoolmen call *poſt-prædicamenta*; wherein, firſt, the four kinds of oppoſition of terms are explained; to wit, *Relative*,

privative, of *contrariety*, and of *contradiction*. This is repeated in all ſyſtems of logic. Laſt of all, we have diſtinctions of the four Greek words which anſwer to the Latin ones, *prius*, *ſimul*, *motus*, and *habere*.

SECT. IV.

OF THE BOOK CONCERNING INTERPRETATION.

We are to conſider, ſays Ariſtotle, what a noun is, what a verb, what affirmation, what negation, what ſpeech. Words are the ſigns of what paſſeth in the mind; writing is the ſign of words. The ſigns both of writing and of words are different in different nations, but the operations of mind ſignified by them are the ſame. There are ſome operations of thought which are neither true nor falſe. Theſe are expreſſed

by nouns or verbs ſingly, and without compoſition.

A noun is a ſound, which by compact ſignifies ſomething without reſpect to time, and of which no part has ſignification by itſelf. The cries of beaſts may have a natural ſignification, but they are not nouns: we give that name only to ſounds which have their ſignification by compact. The caſes of a noun, as the genitive, dative, are not nouns. *Non homo* is not a noun, but, for diſtinction's ſake, may be called a *nomen infinitum.*

A verb ſignifies ſomething by compact with relation to time. Thus, *valet* is a verb; but *valetudo* is a noun, becauſe its ſignification has no relation to time. It is only the preſent tenſe of the indicative that is properly called a verb; the other tenſes and moods are variations of the verb. *Non valet* may be called a *verbum infinitum.*

Speech is ſound ſignificant by compact, of which ſome part is alſo ſignificant; and

it is either enunciative, or not enunciative. Enunciative ſpeech is that which affirms or denies. As to ſpeech which is not enunciative, ſuch as a prayer or a wiſh, the conſideration of it belongs to oratory or poetry. Every enunciative ſpeech muſt have a verb, or ſome variation of a verb. Affirmation is the enunciation of one thing concerning another. Negation is the enunciation of one thing from another. Contradiction is an affirmation and negation that are oppoſite. This is a ſummary of the firſt ſix chapters.

The ſeventh and eighth treat of the various kinds of enunciations or propoſitions, univerſal, particular, indefinite, and ſingular; and of the various kinds of oppoſition in propoſitions, and the axioms concerning them. Theſe things are repeated in every ſyſtem of logic. In the ninth chapter he endeavours to prove, by a long metaphyſical reaſoning, that propoſitions reſpecting future contingencies are not, determinately, either true or falſe; and that, if they were,

it would follow that all things happen neceſſarily, and could not have been otherwiſe than as they are. The remaining chapters contain many minute obſervations concerning the equipollency of propoſitions both pure and modal.

CHAP. II.

REMARKS.

SECT. I.

ON THE FIVE PREDICABLES.

THE writers on logic have borrowed their materials almoſt entirely from Ariſtotle's Organon and Porphyry's Introduction. The Organon, however, was not written by Ariſtotle as one work. It comprehends various tracts, written with the view of making them parts of one whole, and afterwards thrown together by his editors under one name, on account of their affinity. Many of his books that are loſt would have made a part of the Organon, if they had been ſaved.

The three treatiſes, of which we have given a brief account, are unconnected

with each other, and with thoſe that follow. And although the firſt was undoubtedly compiled by Porphyry, and the two laſt probably by Ariſtotle, yet I conſider them as the venerable remains of a philoſophy more ancient than Ariſtotle. Archytas of Tarentum, an eminent mathematician and philoſopher of the Pythagorean ſchool, is ſaid to have wrote upon the ten categories; and the five predicables probably had their origin in the ſame ſchool. Ariſtotle, though abundantly careful to do juſtice to himſelf, does not claim the invention of either. And Porphyry, without aſcribing the latter to Ariſtotle, profeſſes only to deliver the doctrine of the ancients, and chiefly of the Peripatetics, concerning them.

The writers on logic have divided that ſcience into three parts; the firſt treating of ſimple apprehenſion and of terms; the ſecond, of judgment and of propoſitions; and the third, of reaſoning and of ſyllogiſms. The materials of the firſt part are taken from Porphyry's Introduction and

the Categories; and thoſe of the ſecond from the book of Interpretation.

A predicable, according to the grammatical form of the word, might ſeem to ſignify whatever might be predicated, that is, affirmed or denied of a ſubject; and in that ſenſe every predicate would be a predicable. But logicians give a different meaning to the word. They divide propoſitions into certain claſſes, according to the relation which the predicate of the propoſition bears to the ſubject. The firſt claſs is that wherein the predicate is the *genus* of the ſubject; as when we ſay, *This is a triangle, Jupiter is a planet.* In the ſecond class, the predicate is a *ſpecies* of the ſubject; as when we ſay, *This triangle is right-angled.* A third claſs is when the predicate is the ſpecific difference of the ſubject; as when we ſay, *Every triangle has three ſides and three angles.* A fourth, when the predicate is a property of the ſubject; as when we ſay, *The angles of every triangle are equal to two right angles.* And a fifth

claſs is when the predicate is ſomething accidental to the ſubject; as when we ſay, *This triangle is neatly drawn.*

Each of theſe claſſes comprehends a great variety of propoſitions, having different ſubjects and different predicates; but in each claſs the relation between the predicate and the ſubject is the ſame. Now, it is to this relation that logicians have given the name of *a predicable.* Hence it is, that although the number of predicates be infinite, yet the number of predicables can be no greater than that of the different relations which may be in propoſitions between the predicate and the ſubject. And if all propoſitions belong to one or other of the five claſſes above-mentioned, there can be but five predicables, to wit, *genus*, *ſpecies*, *differentia*, *proprium*, and *accidens*. Theſe might, with more propriety perhaps, have been called *the five claſſes of predicates*; but uſe has determined them to be called *the five predicables.*

It may alſo be obſerved, that as ſome

objects of thought are individuals, such as, *Julius Cæsar, the city of Rome*, so others are common to many individuals, as *good, great, virtuous, vicious*. Of this last kind are all things that are expressed by adjectives. Things common to many individuals were by the ancients called *universals*. All predicates are universals, for they have the nature of adjectives; and, on the other hand, all universals may be predicates. On this account, universals may be divided into the same classes as predicates; and as the five classes of predicates above-mentioned have been called the five predicables, so, by the same kind of phraseology, they have been called the *five universals*; although they may more properly be called the *five classes of universals*.

The doctrine of the five universals, or predicables, makes an essential part of every system of logic, and has been handed down without any change to this day. The very name of *predicables shows*, that the author of this division, whoever he was,

intended it as a complete enumeration of all the kinds of things that can be affirmed of any ſubject; and ſo it has always been underſtood. It is accordingly implied in this diviſion, that all that can be affirmed of any thing whatever is either the *genus* of the thing, or its *ſpecies*, or its *ſpecific difference*, or ſome *property* or *accident* belonging to it.

Burgerſdick, a very acute writer in logic, ſeems to have been aware that ſtrong objections might be made to the five predicables, conſidered as a complete enumeration: but, unwilling to allow any imperfection in this ancient diviſion, he endeavours to reſtrain the meaning of the word *predicable*, ſo as to obviate objections. Thoſe things only, ſays he, are to be accounted predicables, which may be affirmed of *many individuals*, *truly*, *properly*, and *immediately*. The conſequence of putting ſuch limitations upon the word *predicable* is, that in many propoſitions, perhaps in moſt, the predicate is not a predicable. But, admit-

ting all his limitations, the enumeration will ſtill be very incomplete; for of many things we may affirm truly, properly, and immediately, their exiſtence, their end, their cauſe, their effect, and various relations which they bear to other things. Theſe, and perhaps many more, are predicables in the ſtrict ſenſe of the word, no leſs than the five which have been ſo long famous.

Although Porphyry and all ſubſequent writers make the predicables to be in number five, yet Ariſtotle himſelf, in the beginning of the Topics, reduces them to four, and demonſtrates that there can be no more. We ſhall give his demonſtration when we come to the Topics; and ſhall only here obſerve, that as Burgerſdick juſtifies the fivefold diviſion, by reſtraining the meaning of the word *predicable*, ſo Ariſtotle juſtifies the fourfold diviſion, by enlarging the meaning of the words *property* and *accident*.

After all, I apprehend that this ancient

diviſion of predicables, with all its imperfections, will bear a compariſon with thoſe which have been ſubſtituted in its ſtead by the moſt celebrated modern philoſophers.

Locke, in his Eſſay on the Human Underſtanding, having laid it down as a principle, That all our knowledge conſiſts in perceiving certain agreements and diſagreements between our ideas, reduces theſe agreements and diſagreements to four heads; to wit, 1. Identity and diverſity; 2. Relation; 3. Coexiſtence; 4. Real exiſtence *. Here are four predicables given as a complete enumeration, and yet not one of the ancient predicables is included in the number.

The author of the Treatiſe of Human Nature, proceeding upon the ſame principle, that all our knowledge is only a perception of the relations of our ideas, obſerves, "That it may perhaps be eſteemed "an endleſs taſk to enumerate all thoſe "qualities which admit of compariſon,

* Book 4. chap. 1.

"and by which the ideas of philoſophical "relation are produced: but, if we dili- "gently conſider them, we ſhall find, that "without difficulty they may be compriſed "under ſeven general heads: 1. Reſem- "blance; 2. Identity; 3. Relations of Space "and Time; 4. Relations of Quantity and "Number; 5. Degrees of Quality; 6. Con- "trariety; 7. Cauſation *." Here again are ſeven predicables given as a complete enumeration, wherein all the predicables of the ancients, as well as two of Locke's, are left out.

The ancients, in their diviſion, attended only to categorical propoſitions which have one ſubject and one predicate; and of theſe to ſuch only as have a general term for their ſubject. The moderns, by their definition of knowledge, have been led to attend only to relative propoſitions, which expreſs a relation between two ſubjects, and theſe ſubjects they ſuppoſe to be always ideas.

* Vol. i. p. 33. and 125

SECT. II.

ON THE TEN CATEGORIES, AND ON DIVISIONS IN GENERAL.

THE intention of the categories or predicaments is to muſter every object of human apprehenſion under ten heads: for the categories are given as a complete enumeration of every thing which can be expreſſed without *compoſition* and *ſtructure*; that is, of every thing that can be either the ſubject or the predicate of a propoſition. So that as every ſoldier belongs to ſome company, and every company to ſome regiment, in like manner every thing that can be the object of human thought has its place in one or other of the ten categories; and, by dividing and ſubdividing properly the ſeveral categories, all the notions that enter into the human mind may be muſtered in rank and file, like an army in the day of battle.

The perfection of the diviſion of categories into ten heads has been ſtrenuouſly defended by the followers of Ariſtotle, as well as that of the five predicables. They are indeed of kin to each other; they breathe the ſame ſpirit, and probably had the ſame origin. By the one we are taught to marſhal every term that can enter into a propoſition, either as ſubject or predicate; and, by the other, we are taught all the poſſible relations which the ſubject can have to the predicate. Thus the whole furniture of the human mind is preſented to us at one view, and contracted, as it were, into a nut-ſhell. To attempt, in ſo early a period, a methodical delineation of the vaſt region of human knowledge, actual and poſſible, and to point out the limits of every diſtrict, was indeed magnanimous in a high degree, and deſerves our admiration, while we lament that the human powers are unequal to ſo bold a flight.

A regular diſtribution of things under proper claſſes or heads is, without doubt,

a great help both to memory and judgment. As the philoſopher's province includes all things, human and divine, that can be objects of inquiry, he is naturally led to attempt ſome general diviſion like that of the Categories. And the invention of a diviſion of this kind, which the ſpeculative part of mankind acquieſced in for two thouſand years, marks a ſuperiority of genius in the inventor, whoever he was. Nor does it appear that the general diviſions which, ſince the decline of the Peripatetic philoſophy, have been ſubſtituted in place of the ten categories, are more perfect.

Locke has reduced all things to three categories; viz. ſubſtances, modes, and relations. In this diviſion, time, ſpace, and number, three great objects of human thought, are omitted.

The author of the Treatiſe of Human Nature has reduced all things to two categories, viz. ideas and impreſſions: a diviſion which is very well adapted to his ſyſtem, and which puts me in mind of

another made by a very excellent mathematician in a printed theſis I have ſeen. In it the author, after a ſevere cenſure of the ten categories of the Peripatetics, maintains that there neither are nor can be more than two categories of things, viz. *data* and *quæſita*.

There are two ends that may be propoſed by ſuch diviſions. The firſt is, to methodize or digeſt in order what a man actually knows. This is neither unimportant nor impracticable; and in proportion to the ſolidity and accuracy of a man's judgment, his diviſions of the things he knows will be elegant and uſeful. The ſame ſubject may admit, and even require, various diviſions, according to the different points of view from which we contemplate it: nor does it follow, that becauſe one diviſion is good, therefore another is naught. To be acquainted with the diviſions of the logicians and metaphyſicians, without a ſuperſtitious attachment to them, may be of uſe in dividing the ſame ſubjects, or even thoſe of a

different nature. Thus Quintilian borrows from the ten categories his diviſion of the topics of rhetorical argumentation. Of all methods of arrangement, the moſt antiphiloſophical ſeems to be the invention of this age; I mean the arranging the arts and ſciences by the letters of the alphabet, in dictionaries and encyclopedias. With theſe authors the categories are, A, B, C, &c.

Another end commonly propoſed by ſuch diviſions, but very rarely attained, is to exhauſt the ſubject divided, ſo that nothing that belongs to it ſhall be omitted. It is one of the general rules of diviſion in all ſyſtems of logic, That the diviſion ſhould be adequate to the ſubject divided: a good rule without doubt, but very often beyond the reach of human power. To make a perfect diviſion, a man muſt have a perfect comprehenſion of the whole ſubject at one view. When our knowledge of the ſubject is imperfect, any diviſion we can make muſt be like the firſt ſketch of a painter, to be extended, contracted, or

mended, as the ſubject ſhall be found to require. Yet nothing is more common, not only among the ancient, but even among modern philoſophers, than to draw, from their incomplete diviſions, concluſions which ſuppoſe them to be perfect.

A diviſion is a repoſitory which the philoſopher frames for holding his ware in convenient order. The philoſopher maintains that ſuch or ſuch a thing is not good ware, becauſe there is no place in his ware-room that fits it. We are apt to yield to this argument in philoſophy, but it would appear ridiculous in any other traffic.

Peter Ramus, who had the ſpirit of a reformer in philoſophy, and who had force of genius ſufficient to ſhake the Ariſtotelian fabric in many parts, but inſufficient to erect any thing more ſolid in its place, tried to remedy the imperfection of philoſophical diviſions, by introducing a new manner of dividing. His diviſions always conſiſted of two members, one of which was contradictory to the other; as if one

ſhould divide England into Middleſex and what is not Middleſex. It is evident that theſe two members comprehend all England; for the logicians obſerve, that a term along with its contradictory comprehends all things. In the ſame manner, we may divide what is not Middleſex into Kent and what is not Kent. Thus one may go on by diviſions and ſubdiviſions that are abſolutely complete. This example may ſerve to give an idea of the ſpirit of Ramean diviſions, which were in no ſmall reputation about two hundred years ago.

Ariſtotle was not ignorant of this kind of diviſion. But he uſed it only as a touch-ſtone to prove by induction the perfection of ſome other diviſion, which indeed is the beſt uſe that can be made of it. When applied to the common purpoſe of diviſion, it is both inelegant and burdenſome to the memory; and, after it has put one out of breath by endleſs ſubdiviſions, there is ſtill a negative term left behind, which ſhows

you are no nearer the end of your ney than when you began.

Until ſome more effectual remedy be nd for the imperfection of diviſions, I leave to propoſe one more ſimple than of Ramus. It is this: When you t with a diviſion of any ſubject imper- ly comprehended, add to the laſt mem- an *et cætera*. That this *et cætera* es the diviſion complete, is undeniable; therefore it ought to hold its place as ember, and to be always underſtood, ther expreſſed or not, until clear and tive proof be brought that the diviſion omplete without it. And this ſame *et ra* is to be the repoſitory of all mem- that ſhall in any future time ſhow a d and valid right to a place in the ect.

SECT. III.

ON DISTINCTIONS.

HAVING ſaid ſo much of logical diviſions, we ſhall next make ſome remarks upon diſtinctions.

Since the philoſophy of Ariſtotle fell into diſrepute, it has been a common topic of wit and raillery to inveigh againſt metaphyſical diſtinctions. Indeed, the abuſe of them in the ſcholaſtic ages ſeems to juſtify a general prejudice againſt them; and ſhallow thinkers and writers have good reaſon to be jealous of diſtinctions, becauſe they make ſad work when applied to their flimſy compoſitions. But every man of true judgment, while he condemns diſtinctions that have no foundation in the nature of things, muſt perceive, that indiſcriminately to decry diſtinctions is to renounce all pretenſions to juſt reaſoning: for as falſe reaſoning commonly proceeds from confound-

ing things that are different, ſo, without diſtinguiſhing ſuch things, it is impoſſible to avoid error or detect ſophiſtry. The authority of Aquinas, or Suarez, or even of Ariſtotle, can neither ſtamp a real value upon diſtinctions of baſe metal, nor hinder the currency of thoſe of true metal.

Some diſtinctions are verbal, others are real. The firſt kind diſtinguiſh the various meanings of a word, whether proper or metaphorical. Diſtinctions of this kind make a part of the grammar of a language, and are often abſurd when tranſlated into another language. Real diſtinctions are equally good in all languages, and ſuffer no hurt by tranſlation. They diſtinguiſh the different ſpecies contained under ſome general notion, or the different parts contained in one whole.

Many of Ariſtotle's diſtinctions are verbal merely, and therefore more proper materials for a dictionary of the Greek language than for a philoſophical treatiſe. At leaſt, they ought never to have been tranſlated into

other languages, when the idiom of the language will not juſtify them; for this is to adulterate the language, to introduce foreign idioms into it without neceſſity or uſe, and to make it ambiguous where it was not. The diſtinction in the end of the Categories of the four words, *prius*, *ſimul*, *motus*, and *habere*, are all verbal.

The modes or ſpecies of *prius*, according to Ariſtotle, are five. One thing may be prior to another; firſt, in point of time; ſecondly, in point of dignity; thirdly, in point of order; and ſo forth. The modes of *ſimul* are only three. It ſeems this word was not uſed in the Greek with ſo great latitude as the other, although they are relative terms.

The modes or ſpecies of motion he makes to be ſix, viz. generation, corruption, increaſe, decreaſe, alteration, and change of place.

The modes or ſpecies of *having* are eight, 1. Having a quality or habit, as having wiſdom. 2. Having quantity or

magnitude. 3. Having things adjacent, as having a ſword. 4. Having things as parts, as having hands or feet. 5. Having in a part or on a part, as having a ring on one's finger. 6. Containing, as a caſk is ſaid to have wine. 7. Poſſeſſing, as having lands or houſes. 8. Having a wife.

Another diſtinction of this kind is Ariſtotle's diſtinction of cauſes; of which he makes four kinds, efficient, material, formal, and final. Theſe diſtinctions may deſerve a place in a dictionary of the Greek language; but, in Engliſh or Latin, they adulterate the language. Yet ſo fond were the ſchoolmen of diſtinctions of this kind, that they added to Ariſtotle's enumeration an impulſive cauſe, an exemplary cauſe, and I don't know how many more. We ſeem to have adopted into Engliſh a final cauſe; but it is merely a term of art, borrowed from the Peripatetic philoſophy, without neceſſity or uſe; for the Engliſh word *end* is as good as *final cauſe*, though not ſo long nor ſo learned.

SECT. IV.

ON DEFINITIONS.

IT remains that we make ſome remarks on Ariſtotle's definitions, which have expoſed him to much cenſure and ridicule. Yet I think it muſt be allowed, that in things which need definition, and admit of it, his definitions are commonly judicious and accurate; and, had he attempted to define ſuch things only, his enemies had wanted great matter of triumph. I believe it may likewiſe be ſaid in his favour, that, until Locke's eſſay was wrote, there was nothing of importance delivered by philoſophers, with regard to definition, beyond what Ariſtotle has ſaid upon that ſubject.

He conſiders a definition as a ſpeech declaring what a thing is. Every thing eſſential to the thing defined, and nothing more, muſt be contained in the definition. Now, the eſſence of a thing conſiſts of theſe

two parts: firſt, What is common to it with other things of the ſame kind; and, ſecondly, What diſtinguiſhes it from other things of the ſame kind. The firſt is called the *genus* of the thing, the ſecond its *ſpecific difference*. The definition, therefore, conſiſts of theſe two parts. And, for finding them, we muſt have recourſe to the ten categories, in one or other of which every thing in nature is to be found. Each category is a *genus*, and is divided into ſo many ſpecies, which are diſtinguiſhed by their ſpecific differences. Each of theſe ſpecies is again ſubdivided into ſo many ſpecies, with regard to which it is a genus. This diviſion and ſubdiviſion continues until we come to the loweſt ſpecies, which can only be divided into individuals diſtinguiſhed from one another, not by any ſpecific difference, but by accidental differences of time, place, and other circumſtances.

The category itſelf, being the higheſt genus, is in no reſpect a ſpecies, and the loweſt *ſpecies* is in no reſpect a *genus*; but

every intermediate order is a genus compared with thoſe that are below it, and a ſpecies compared with thoſe above it. To find the definition of any thing, therefore, you muſt take the genus which is immediately above its place in the category, and the ſpecific *difference*, by which it is diſtinguiſhed from other ſpecies of the ſame *genus*. Theſe two make a perfect definition. This I take to be the ſubſtance of Ariſtotle's ſyſtem, and probably the ſyſtem of the Pythagorean ſchool, before Ariſtotle, concerning definition.

But notwithſtanding the ſpecious appearance of this ſyſtem, it has its defects. Not to repeat what was before ſaid of the imperfection of the diviſion of things into ten categories, the ſubdiviſions of each category are no leſs imperfect. Ariſtotle has given ſome ſubdiviſions of a few of them; and, as far as he goes, his followers pretty unanimouſly take the ſame road. But, when they attempt to go farther, they take very different roads. It is evident, that if

the ſeries of each category could be completed, and the diviſion of things into categories could be made perfect, ſtill the higheſt genus in each category could not be defined, becauſe it is not a ſpecies; nor could individuals be defined, becauſe they have no ſpecific difference. There are alſo many ſpecies of things whoſe ſpecific difference cannot be expreſſed in language, even when it is evident to ſenſe, or to the underſtanding. Thus, green, red, and blue, are very diſtinct ſpecies of colour; but who can expreſs in words wherein green differs from red or blue?

Without borrowing light from the ancient ſyſtem, we may perceive that every definition muſt conſiſt of words that need no definition; and that to define the common words of a language that have no ambiguity is trifling, if it could be done; the only uſe of a definition being to give a clear and adequate conception of the meaning of a word.

The logicians indeed diſtinguiſh between

the definition of a word, and the definition of a thing; conſidering the former as the mean office of a lexicographer, but the laſt as the grand work of a philoſopher. But what they have ſaid about the definition of a thing, if it have a meaning, is beyond my comprehenſion. All the rules of definition agree to the definition of a word: and if they mean, by the definition of a thing, the giving an adequate conception of the nature and eſſence of any thing that exiſts, this is impoſſible, and is the vain boaſt of men unconſcious of the weakneſs of human underſtanding.

The works of God are but imperfectly known by us. We ſee their outſide, or perhaps we diſcover ſome of their qualities and relations, by obſervation and experiment, aſſiſted by reaſoning: but, even of the ſimpleſt of them, we can give no definition that comprehends its real eſſence. It is juſtly obſerved by Locke, that nominal eſſences only, which are the creatures of our own minds, are perfectly comprehended

by us, or can be properly defined; and even of theſe there are many too ſimple in their nature to admit of definition. When we cannot give preciſion to our notions by a definition, we muſt endeavour to do it by attentive reflection upon them, by obſerving minutely their agreements and differences, and eſpecially by a right underſtanding of the powers of our own minds, by which ſuch notions are formed.

The principles laid down by Locke with regard to definition, and with regard to the abuſe of words, carry conviction along with them. I take them to be one of the moſt important improvements made in logic ſince the days of Ariſtotle; not ſo much becauſe they enlarge our knowledge, as becauſe they make us ſenſible of our ignorance, and ſhow that a great part of what ſpeculative men have admired as profound philoſophy, is only a darkening of knowledge by words without underſtanding.

SECT. V.

ON THE STRUCTURE OF SPEECH.

THE few hints contained in the beginning of the book concerning interpretation relating to the ſtructure of ſpeech, have been left out in treatiſes of logic, as belonging rather to grammar; yet I apprehend this is a rich field of philoſophical ſpeculation. Language being the expreſs image of human thought, the analyſis of the one muſt correſpond to that of the other. Nouns adjective and ſubſtantive, verbs active and paſſive, with their various moods, tenſes, and perſons, muſt be expreſſive of a like variety in the modes of thought. Things that are diſtinguiſhed in all languages, ſuch as ſubſtance and quality, action, and paſſion, cauſe and effect, muſt be diſtinguiſhed by the natural powers of the human mind. The philo-

ſophy of grammar, and that of the human underſtanding, are more nearly allied than is commonly imagined.

The ſtructure of language was purſued to a conſiderable extent by the ancient commentators upon this book of Ariſtotle. Their ſpeculations upon this ſubject, which are neither the leaſt ingenious nor the leaſt uſeful part of the Peripatetic philoſophy, were neglected for many ages, and lay buried in ancient manuſcripts, or in books little known, till they were lately brought to light by the learned Mr Harris in his Hermes.

The definitions given by Ariſtotle of a noun, of a verb, and of ſpeech, will hardly bear examination. It is eaſy in practice to diſtinguiſh the various parts of ſpeech; but very difficult, if at all poſſible, to give accurate definitions of them.

He obſerves juſtly, that beſides that kind of ſpeech called a *propoſition*, which is always either true or falſe, there are other kinds which are neither true nor falſe,

ſuch as a prayer or wiſh; to which we may add, a queſtion, a command, a promiſe, a contract, and many others. Theſe Ariſtotle pronounces to have nothing to do with his ſubject, and remits them to oratory or poetry; and ſo they have remained baniſhed from the regions of philoſophy to this day: yet I apprehend that an analyſis of ſuch ſpeeches, and of the operations of mind which they expreſs, would be of real uſe, and perhaps would diſcover how imperfect an enumeration the logicians have given of the powers of human underſtanding, when they reduce them to ſimple apprehenſion, judgment, and reaſoning.

SECT. VI.

ON PROPOSITIONS.

MATHEMATICIANS uſe the word *propoſition* in a larger ſenſe than logicians. A problem is called a *propoſition* in mathematics, but in logic it is not a propoſition: it is one of thoſe ſpeeches which are not enunciative, and which Ariſtotle remits to oratory or poetry.

A propoſition, according to Ariſtotle, is a ſpeech wherein one thing is affirmed or denied of another. Hence it is eaſy to diſtinguiſh the thing affirmed or denied, which is called *the predicate*, from the thing of which it is affirmed or denied, which is called *the ſubject*; and theſe two are called *the terms of the propoſition*. Hence, likewiſe, it appears that propoſitions are either affirmative or negative, and this is called *their quality*. All affirmative propoſitions have the ſame quality, ſo likewiſe have all

negative; but an affirmative and a negative are contrary in their quality.

When the ſubject of a propoſition is a general term, the predicate is affirmed or denied either of the whole or of a part. Hence propoſitions are diſtinguiſhed into univerſal and particular. *All men are mortal*, is an univerſal propoſition; *Some men are learned*, is a particular; and this is called *the quantity of the propoſition*. All univerſal propoſitions agree in quantity, as alſo all particular; but an univerſal and a particular are ſaid to differ in quantity. A propoſition is called *indefinite*, when there is no mark either of univerſality or particularity annexed to the ſubject: thus, *Man is of few days*, is an indefinite propoſition; but it muſt be underſtood either as univerſal or as particular, and therefore is not a third ſpecies, but by interpretation is brought under one of the other two.

There are alſo ſingular propoſitions, which have not a general term, but an individual, for their ſubject; as, *Alexander*

as a great conqueror. Theſe are conſi-
red by logicians as univerſal, becauſe,
e ſubject being indiviſible, the predicate
affirmed or denied of the whole, and not
a part only. Thus all propoſitions, with
gard to quality, are either affirmative or
gative, and, with regard to quantity,
e univerſal or particular; and, taking in
th quantity and quality, they are uni-
rſal affirmatives, or univerſal negatives,
particular affirmatives, or particular ne-
atives. Theſe four kinds, after the days
Ariſtotle, came to be named by the
mes of the four firſt vowels, A, E, I, O,
cording to the following diſtich:

Asserit, A, negat E, sed universaliter ambæ;
Asserit I, negat O, sed particulariter ambo.

When the young logician is thus far
ſtructed in the nature of propoſitions, he
apt to think there is no difficulty in ana-
zing any propoſition, and ſhowing its
bject and predicate, its quantity and
uality; and indeed, unleſs he can do this,

he will be unable to apply the rules of logic to uſe. Yet he will find there are ſome difficulties in this analyſis, which are overlooked by Ariſtotle altogether; and although they are ſometimes touched, they are not removed, by his followers. For, 1. There are propoſitions in which it is difficult to find a ſubject and a predicate; as in theſe, *It rains, it ſnows.* 2. In ſome propoſitions, either term may be made the ſubject or the predicate, as you like beſt; as in this, *Virtue is the road to happineſs.* 3. The ſame example may ſerve to ſhow, that it is ſometimes difficult to ſay whether a propoſition be univerſal or particular. 4. The quality of ſome propoſitions is ſo dubious, that logicians have never been able to agree whether they be affirmative or negative; as in this propoſition, *Whatever is inſentient is not an animal.* 5. As there is one claſs of propoſitions which has only two terms, viz. one ſubject and one predicate, which are called *categorical propoſitions;* ſo there are many claſſes

that have more than two terms. What Ariſtotle delivers in this book is applicable only to categorical propoſitions; and to them only the rules concerning the converſion of propoſitions, and concerning the figures and modes of ſyllogiſms, are accommodated. The ſubſequent writers of logic have taken notice of ſome of the many claſſes of complex propoſitions, and have given rules adapted to them; but, finding this work endleſs, they have left us to manage the reſt by the rules of common ſenſe.

CHAP. III.

ACCOUNT OF THE FIRST ANALYTICS.

SECT. I.

OF THE CONVERSION OF PROPOSITIONS.

In attempting to give ſome account of the Analytics and of the Topics of Ariſtotle, ingenuity requires me to confeſs, that though I have often purpoſed to read the whole with care, and to underſtand what is intelligible, yet my courage and patience always failed before I had done. Why ſhould I throw away ſo much time and painful attention upon a thing of ſo little real uſe? If I had lived in thoſe ages when the knowledge of Ariſtotle's Organon entitled a man to the higheſt rank in philo-

ſophy, ambition might have induced me to employ upon it ſome years of painful ſtudy; and leſs, I conceive, would not be ſufficient. Such reflections as theſe always got the better of my reſolution, when the firſt ardour began to cool. All I can ſay is, that I have read ſome parts of the different books with care, ſome ſlightly, and ſome, perhaps, not at all. I have glanced over the whole often, and when any thing attracted my attention, have dipped into it till my appetite was ſatisfied. Of all reading, it is the moſt dry and the moſt painful, employing an infinite labour of demonſtration, about things of the moſt abſtract nature, delivered in a laconic ſtyle, and often, I think, with affected obſcurity; and all to prove general propoſitions, which, when applied to particular inſtances, appear ſelf-evident.

There is probably but little in the Categories, or in the book of Interpretation, that Ariſtotle could claim as his own invention; but the whole theory of ſyllo-

giſms he claims as his own, and as the fruit of much time and labour. And indeed it is a ſtately fabric, a monument of a great genius, which we could wiſh to have been more uſefully employed. There muſt be ſomething, however, adapted to pleaſe the human underſtanding, or to flatter human pride, in a work which occupied men of ſpeculation for more than a thouſand years. Theſe books are called *Analytics*, becauſe the intention of them is to reſolve all reaſoning into its ſimple ingredients.

The firſt book of the firſt Analytics, conſiſting of forty-ſix chapters, may be divided into four parts; the firſt treating of the converſion of propoſitions; the ſecond, of the ſtructure of ſyllogiſms, in all the different figures and modes; the third, of the invention of a middle term; and the laſt, of the reſolution of ſyllogiſms. We ſhall give a brief account of each.

To convert a propoſition is to infer from it another propoſition, whoſe ſubject

redicate of the firſt, and whoſe pre-
s the ſubject of the firſt. This is
by Ariſtotle to three rules.
niverſal negative may be converted
univerſal negative: thus, *No man*
druped; therefore, *No quadruped is*

2. An univerſal affirmative can
erted only into a particular affirma-
ius, *All men are mortal*; therefore,
rtal beings are men. 3. A particu-
rmative may be converted into a
ar affirmative; as, *Some men are*
herefore, *Some juſt perſons are men.*
a propoſition may be converted
: changing its quantity, this is called
onverſion; but when the quantity
niſhed, as in the univerſal affirma-
is called converſion *per accidens.*
e is another kind of converſion
in this place by Ariſtotle, but ſup-
y his followers, called *converſion by*
ſition, in which the term that is
lictory to the predicate is put for
ject, and the quality of the propoſi-

tion is changed; as, *All animals are ſentient*; therefore, *What is inſentient is not an animal.* A fourth rule of converſion, therefore, is That an univerſal affirmative and a particular negative may be converted by contrapoſition.

SECT. II.

OF THE FIGURES AND MODES OF PURE SYLLOGISMS.

A SYLLOGISM is an argument, or reaſoning, conſiſting of three propoſitions, the laſt of which, called the *concluſion*, is inferred from the two preceding, which are called the *premiſes*. The concluſion having two terms, a ſubject and a predicate, its predicate is called the *major* term, and its ſubject the *minor* term. In order to prove the concluſion, each of its terms is, in the premiſes, compared with a third term, called the *middle* term. By this means one of the premiſes will have for its two

terms the major term and the middle term; and this premiſe is called the *major* premiſe, or the *major* propoſition of the ſyllogiſm. The other premiſe muſt have for its two terms the minor term and the middle term, and it is called the *minor* propoſition. Thus the ſyllogiſm conſiſts of three propoſitions, diſtinguiſhed by the names of the *major*, the *minor*, and the *concluſion*: and although each of theſe has two terms, a ſubject and a predicate, yet there are only three different terms in all. The major term is always the predicate of the concluſion, and is alſo either the ſubject or predicate of the major propoſition. The minor term is always the ſubject of the concluſion, and is alſo either the ſubject or predicate of the minor propoſition. The middle term never enters into the concluſion, but ſtands in both premiſes, either in the poſition of ſubject or of predicate.

According to the various poſitions which the middle term may have in the premiſes,

ſyllogiſms are ſaid to be of various figures. Now, all the poſſible poſitions of the middle term are only four: for, firſt, it may be the ſubject of the major propoſition, and the predicate of the minor, and then the ſyllogiſm is of the firſt figure; or it may be the predicate of both premiſes, and then the ſyllogiſm is of the ſecond figure; or it may be the ſubject of both, which makes a ſyllogiſm of the third figure; or it may be the predicate of the major propoſition, and the ſubject of the minor, which makes the fourth figure. Ariſtotle takes no notice of the fourth figure. It was added by the famous Galen, and is often called *the Galenical figure.*

There is another diviſion of ſyllogiſms according to their modes. The mode of a ſyllogiſm is determined by the quality and quantity of the propoſitions of which it conſiſts. Each of the three propoſitions muſt be either an univerſal affirmative or an univerſal negative, or a particular affirmative or a particular negative. Theſe

four kinds of propoſitions, as was before obſerved, have been named by the four vowels, A, E, I, O; by which means the mode of a ſyllogiſm is marked by any three of thoſe four vowels. Thus, A, A, A, denotes that mode in which the major, minor, and concluſion, are all univerſal affirmatives; E, A, E, denotes that mode in which the major and concluſion are univerſal negatives, and the minor is an univerſal affirmative.

To know all the poſſible modes of ſyllogiſm, we muſt find how many different combinations may be made of three out of the four vowels; and from the art of combination the number is found to be ſixty-four. So many poſſible modes there are in every figure, conſequently in the three figures of Ariſtotle there are one hundred and ninety-two, and in all the four figures two hundred and fifty-ſix.

Now, the theory of ſyllogiſm requires that we ſhow what are the particular modes in each figure which do or do not form a

juſt and concluſive ſyllogiſm, that ſo the legitimate may be adopted, and the ſpurious rejected. This Ariſtotle has ſhown in the firſt three figures, examining all the modes one by one, and paſſing ſentence upon each; and from this examination he collects ſome rules which may aid the memory in diſtinguiſhing the falſe from the true, and point out the properties of each figure.

The firſt figure has only four legitimate modes. The major propoſition in this figure muſt be univerſal, and the minor affirmative; and it has this property, that it yields concluſions of all kinds, affirmative and negative, univerſal and particular.

The ſecond figure has alſo four legitimate modes. Its major propoſition muſt be univerſal, and one of the premiſes muſt be negative. It yields concluſions both univerſal and particular, but all negative.

The third figure has ſix legitimate modes. Its minor muſt always be affirmative; and

it yields concluſions both affirmative and negative, but all particular.

Beſides the rules that are proper to each figure, Ariſtotle has given ſome that are common to all, by which the legitimacy of ſyllogiſms may be tried. Theſe may, I think, be reduced to five. 1. There muſt be only three terms in a ſyllogiſm. As each term occurs in two of the propoſitions, it muſt be preciſely the ſame in both: if it be not, the ſyllogiſm is ſaid to have four terms, which makes a vitious ſyllogiſm. 2. The middle term muſt be taken univerſally in one of the premiſes. 3. Both premiſes muſt not be particular propoſitions, nor both negative. 4. The concluſion muſt be particular, if either of the premiſes be particular; and negative, if either of the premiſes be negative. 5. No term can be taken univerſally in the concluſion, if it be not taken univerſally in the premiſes.

For underſtanding the ſecond and fifth of theſe rules, it is neceſſary to obſerve,

that a term is ſaid to be taken univerſally, not only when it is the ſubject of an univerſal propoſition, but when it is the predicate of a negative propoſition; on the other hand, a term is ſaid to be taken particularly, when it is either the ſubject of a particular, or the predicate of an affirmative propoſition.

SECT. III.

OF THE INVENTION OF A MIDDLE TERM.

THE third part of this book contains rules, general and ſpecial, for the invention of a middle term; and this the author conceives to be of great utility. The general rules amount to this, That you are to conſider well both terms of the propoſition to be proved; their definition, their properties, the things which may be affirmed or denied of them, and thoſe of

which they may be affirmed or denied: theſe things collected together are the materials from which your middle term is to be taken.

The ſpecial rules require you to conſider the quantity and quality of the propoſition to be proved, that you may diſcover in what mode and figure of ſyllogiſm the proof is to proceed. Then, from the materials before collected, you muſt ſeek a middle term which has that relation to the ſubject and predicate of the propoſition to be proved, which the nature of the ſyllogiſm requires. Thus, ſuppoſe the propoſition I would prove is an univerſal affirmative, I know by the rules of ſyllogiſms that there is only one legitimate mode in which an univerſal affirmative propoſition can be proved; and that is the firſt mode of the firſt figure. I know likewiſe that, in this mode, both the premiſes muſt be univerſal affirmatives; and that the middle term muſt be the ſubject of the major, and the predicate o the minor. Therefore

of the terms collected according to the general rule, I ſeek out one or more which have theſe two properties; firſt, That the predicate of the propoſition to be proved can be univerſally affirmed of it; and ſecondly, That it can be univerſally affirmed of the ſubject of the propoſition to be proved. Every term you can find, which has thoſe two properties, will ſerve you as a middle term, but no other. In this way, the author gives ſpecial rules for all the various kinds of propoſitions to be proved; points out the various modes in which they may be proved, and the properties which the middle term muſt have to make it fit for anſwering that end. And the rules are illuſtrated, or rather, in my opinion, purpoſely darkened, by putting letters of the alphabet for the ſeveral terms.

SECT. IV.

OF THE REMAINING PART OF THE FIRST BOOK.

THE reſolution of ſyllogiſms requires no other principles but theſe before laid down for conſtructing them. However, it is treated of largely, and rules laid down for reducing reaſoning to ſyllogiſms, by ſupplying one of the premiſes, when it is underſtood, by rectifying inverſions, and putting the propoſitions in the proper order.

Here he ſpeaks alſo of hypothetical ſyllogiſms, which he acknowledges cannot be reſolved into any of the figures, although there be many kinds of them that ought diligently to be obſerved, and which he promiſes to handle afterwards. But this promiſe is not fulfilled, as far as I know, in any of his works that are extant.

SECT. V.

OF THE SECOND BOOK OF THE FIRST ANALYTICS.

THE ſecond book, treats of the powers of ſyllogiſms, and ſhows, in twenty-ſeven chapters, how we may perform many feats by them, and what figures and modes are adapted to each. Thus, in ſome ſyllogiſms, ſeveral diſtinct concluſions may be drawn from the ſame premiſes: in ſome, true concluſions may be drawn from falſe premiſes: in ſome, by aſſuming the concluſion and one premiſe, you may prove the other; you may turn a direct ſyllogiſm into one leading to an abſurdity.

We have likewiſe precepts given in this book, both to the aſſailant in a ſyllogiſtical diſpute, how to carry on his attack with art, ſo as to obtain the victory, and to the defendant, how to keep the enemy at ſuch

a diſtance as that he ſhall never be obliged to yield. From which we learn, that Ariſtotle introduced in his own ſchool the practice of ſyllogiſtical diſputation, inſtead of the rhetorical diſputations which the ſophiſts were wont to uſe in more ancient times.

CHAP. IV.

REMARKS.

SECT. I.

OF THE CONVERSION OF PROPOSITIONS.

WE have given a ſummary view of the theory of pure ſyllogiſms as delivered by Ariſtotle, a theory of which he claims the ſole invention. And I believe it will be difficult, in any ſcience, to find ſo large a ſyſtem of truths of ſo very abſtract and ſo general a nature, all fortified by demonſtration, and all invented and perfected by one man. It ſhows a force of genius, and labour of inveſtigation, equal to the moſt arduous attempts. I ſhall now make ſome remarks upon it.

As to the converſion of propoſitions, the writers on logic commonly ſatisfy themſelves with illuſtrating each of the rules by an example, conceiving them to be ſelf-evident when applied to particular caſes. But Ariſtotle has given demonſtrations of the rules he mentions. As a ſpecimen, I ſhall give his demonſtration of the firſt rule. "Let A B be an univerſal negative propoſition; I ſay, that if A is "in no B, it will follow that B is in no A. "If you deny this conſequence, let B be "in ſome A, for example, in C; then the "firſt ſuppoſition will not be true; for "C is of the B's." In this demonſtration, if I underſtand it, the third rule of converſion is aſſumed, that if B is in ſome A, then A muſt be in ſome B, which indeed is contrary to the firſt ſuppoſition. If the third rule be aſſumed for proof of the firſt, the proof of all the three goes round in a circle; for the ſecond and third rules are proved by the firſt. This is a fault in reaſoning which Ariſtotle condemns, and

which I would be very unwilling to charge him with, if I could find any better meaning in his demonſtration. But it is indeed a fault very difficult to be avoided, when men attempt to prove things that are ſelf-evident.

The rules of converſion cannot be applied to all propoſitions, but only to thoſe that are categorical; and we are left to the direction of common ſenſe in the converſion of other propoſitions. To give an example: Alexander was the ſon of Philip; therefore Philip was the father of Alexander: A is greater than B; therefore B is leſs than A. Theſe are converſions which, as far as I know, do not fall within any rule in logic; nor do we find any loſs for want of a rule in ſuch caſes.

Even in the converſion of categorical propoſitions, it is not enough to tranſpoſe the ſubject and predicate. Both muſt undergo ſome change, in order to fit them for their new ſtation: for, in every pro-

poſition the ſubject muſt be a ſubſtantive, or have the force of a ſubſtantive; and the predicate muſt be an adjective, or have the force of an adjective. Hence it follows that when the ſubject is an individual, the propoſition admits not of converſion. How, for inſtance, ſhall we convert this propoſition, God is omniſcient?

Theſe obſervations ſhow that the doctrine of the converſion of propoſitions is not ſo complete as it appears. The rules are laid down without any limitation, yet they are fitted only to one claſs of propoſitions, viz. the categorical; and of theſe only to ſuch as have a general term for their ſubject.

SECT. II.

ON ADDITIONS MADE TO ARISTOTLE'S THEORY.

ALTHOUGH the logicians have enlarged the firſt and ſecond parts of logic, by explaining ſome technical words and diſtinctions which Ariſtotle has omitted, and by giving names to ſome kinds of propoſitions which he overlooks, yet, in what concerns the theory of categorical ſyllogiſms, he is more full, more minute and particular, than any of them; ſo that they ſeem to have thought this capital part of the Organon rather redundant than deficient.

It is true that Galen added a fourth figure to the three mentioned by Ariſtotle. But there is reaſon to think that Ariſtotle omitted the fourth figure, not through ignorance or inattention, but of deſign,

as containing only ſome indirect modes which, when properly expreſſed, fall into the firſt figure.

It is true alſo that Peter Ramus, a profeſſed enemy of Ariſtotle, introduced ſome new modes that are adapted to ſingular propoſitions, and that Ariſtotle takes no notice of ſingular propoſitions, either in his rules of converſion, or in the modes of ſyllogiſm. But the friends of Ariſtotle have ſhown that this improvement of Ramus is more ſpecious than uſeful. Singular propoſitions have the force of univerſal propoſitions, and are ſubject to the ſame rules. The definition given by Ariſtotle of an univerſal propoſition applies to them, and therefore he might think that there was no occaſion to multiply the modes of ſyllogiſm upon their account.

Theſe attempts, therefore, ſhow rather inclination than power to diſcover any material defect in Ariſtotle's theory.

The moſt valuable addition made to the theory of categorical ſyllogiſms ſeems to

be the invention of thoſe technical names given to the legitimate modes, by which they may be eaſily remembered, and which have been compriſed in theſe barbarous verſes:

Barbara, Celarent, Darii, Ferio, dato primæ;
Cæſare, Cameſtris, Feſtino, Baroco, ſecundæ;
Tertia grande ſonans recitat *Darapti, Felapton;*
Adjungens *Diſamis, Datiſi, Bocardo, Feriſon.*

In theſe verſes, every legitimate mode belonging to the three figures has a name given to it, by which it may be diſtinguiſhed and remembered. And this name is ſo contrived as to denote its nature; for the name has three vowels, which denote the kind of each of its propoſitions.

Thus, a ſyllogiſm in *Bocardo* muſt be made up of the propoſitions denoted by the three vowels, O, A, O; that is, its major and concluſion muſt be particular negative propoſitions, and its minor an univerſal affirmative; and, being in the third figure, the middle term muſt be the ſubject of both premiſes.

This is the myſtery contained in the vowels of thoſe barbarous words. But there are other myſteries contained in their conſonants; for, by their means, a child may be taught to reduce any ſyllogiſm of the ſecond or third figure to one of the firſt. So that the four modes of the firſt figure being directly proved to be concluſive, all the modes of the other two are proved at the ſame time, by means of this operation of reduction. For the rules and manner of this reduction, and the different ſpecies of it, called *oſtenſive* and *per impoſſible*, I refer to the logicians, that I may not not diſcloſe all their myſteries.

The invention contained in theſe verſes is ſo ingenious, and ſo great an adminicle to the dexterous management of ſyllogiſms, that I think it very probable that Ariſtotle had ſome contrivance of this kind, which was kept as one of the ſecret doctrines of his ſchool, and handed down by tradition, until ſome perſon brought it to light. This is offered only as a conjecture, leaving it to

thoſe who are better acquainted with the moſt ancient commentators on the Analytics, either to confute or confirm it.

SECT. III.

ON EXAMPLES USED TO ILLUSTRATE THIS THEORY.

We may obſerve that Ariſtotle hardly ever gives examples of real ſyllogiſms to illuſtrate his rules. In demonſtrating the legitimate modes, he takes A, B, C, for the terms of the ſyllogiſm. Thus, the firſt mode of the firſt figure is demonſtrated by him in this manner: "For," ſays he, "if A is attributed to every B, and B "to every C, it follows neceſſarily that "A may be attributed to every C." For diſproving the illegitimate modes, he uſes the ſame manner; with this difference, that he commonly, for an example, gives

three real terms, ſuch as, *bonum*, *habitus*, *prudentia*; of which three terms you are to make up a ſyllogiſm of the figure and mode in queſtion, which will appear to be inconcluſive.

The commentators and ſyſtematical writers in logic have ſupplied this defect, and given us real examples of every legitimate mode in all the figures. We acknowledge this to be charitably done, in order to aſſiſt the conception in matters ſo very abſtract; but whether it was prudently done, for the honour of the art, may be doubted. I am afraid this was to uncover the nakedneſs of the theory; it has undoubtedly contributed to bring it into contempt; for when one conſiders the ſilly and uninſtructive reaſonings that have been brought forth by this grand organ of ſcience, he can hardly forbear crying out, *Parturiunt montes, et naſcitur ridiculus mus.* Many of the writers of logic are acute and ingenious, and much practiſed in the ſyllogiſtical art; and there muſt be ſome reaſon

why the examples they have given of ſyllogiſms are ſo lean.

We ſhall ſpeak of the reaſon afterwards, and ſhall now give a ſyllogiſm in each figure as an example.

No work of God is bad;

The natural paſſions and appetites of men are the work of God;

Therefore none of them is bad.

In this ſyllogiſm, the middle term, *work of God*, is the ſubject of the major, and the predicate of the minor; ſo that the ſyllogiſm is of the firſt figure. The mode is that called *Celarent*; the major and concluſion being both univerſal negatives, and the minor an univerſal affirmative. It agrees to the rules of the figure, as the major is univerſal, and the minor affirmative; it is alſo agreeable to all the general rules; ſo that it maintains its character in every trial. And to ſhow of what ductile materials ſyllogiſms are made, we may, by converting ſimply the major propoſition, reduce it to a good ſyllogiſm of the

ſecond figure, and of the mode *Ceſare*, thus:

Whatever is bad is not the work of God;

All the natural paſſions and appetites of men are the work of God;

Therefore they are not bad.

Another example:

Every thing virtuous is praiſe-worthy;

Some pleaſures are not praiſe-worthy;

Therefore ſome pleaſures are not virtuous.

Here the middle term *praiſe-worthy* being the predicate of both premiſes, the ſyllogiſm is of the ſecond figure; and ſeeing it is made up of the propoſitions, A, O, O, the mode is *Baroco*. It will be found to agree both with the general and ſpecial rules; and it may be reduced into a good ſyllogiſm of the firſt figure upon converting the major by contrapoſition, thus:

What is not praiſe-worthy is not virtuous;

Some pleaſures are not praiſe-worthy;
Therefore ſome pleaſures are not virtuous.

That this ſyllogiſm is concluſive common ſenſe pronounces, and all logicians muſt allow; but it is ſomewhat unpliable to rules, and requires a little ſtraining to make it tally with them.

That it is of the firſt figure is beyond diſpute; but to what mode of that figure ſhall we refer it? This is a queſtion of ſome difficulty: For, in the firſt place, the premiſes ſeem to be both negative, which contradicts the third general rule; and, moreover, it is contrary to a ſpecial rule of the firſt figure, That the minor ſhould be negative. Theſe are the difficulties to be removed.

Some logicians think that the two negative particles in the major are equivalent to an affirmative; and that therefore the major propoſition, *What is not praiſe-worthy is not virtuous*, is to be accounted an affirmative propoſition. This, if granted,

ſolves one difficulty; but the other remains. The moſt ingenious ſolution, therefore, is this: Let the middle term be *not praiſe-worthy*. Thus, making the negative particle a part of the middle term, the ſyllogiſm ſtands thus:

Whatever is *not praiſe-worthy* is not virtuous;

Some pleaſures are *not praiſe-worthy*;

Therefore ſome pleaſures are not virtuous.

By this analyſis, the major becomes an univerſal negative, the minor a particular affirmative, and the concluſion a particular negative, and ſo we have a juſt ſyllogiſm in *Ferio*.

We ſee, by this example, that the quality of propoſitions is not ſo invariable but that, when occaſion requires, an affirmative may be degraded into a negative, or a negative exalted to an affirmative.

Another example:

All Africans are black;

All Africans are men;

Therefore ſome men are black.

This is of the third figure, and of the mode *Darapti*; and it may be reduced to *Darii* in the firſt figure, by converting the minor.

All Africans are black:
Some men are Africans;
Therefore ſome men are black.

By this time I apprehend the reader has got as many examples of ſyllogiſms as will ſtay his appetite for that kind of entertainment.

SECT. IV.

ON THE DEMONSTRATION OF THE THEORY.

ARISTOTLE and all his followers have thought it neceſſary, in order to bring this theory of categorical ſyllogiſms to a ſcience, to demonſtrate both that the fourteen authorized modes conclude juſtly, and

that none of the reſt do. Let us now ſee how this has been executed.

As to the legitimate modes, Ariſtotle and thoſe who follow him the moſt cloſely demonſtrate the four modes of the firſt figure directly from an axiom called the *Dictum de omni et nullo.* The amount of the axiom is, That what is affirmed of a whole genus may be affirmed of all the ſpecies and individuals belonging to that genus; and that what is denied of the whole genus may be denied of its ſpecies and individuals. The four modes of the firſt figure are evidently included in this axiom. And as to the legitimate modes of the other figures, they are proved by reducing them to ſome mode of the firſt. Nor is there any other principle aſſumed in theſe reductions but the axioms concerning the converſion of propoſitions, and, in ſome caſes, the axioms concerning the oppoſition of propoſitions.

As to the illegitimate modes, Ariſtotle has taken the labour to try and condemn them one by one in all the three figures;

but this is done in ſuch a manner that it is very painful to follow him. To give a ſpecimen: In order to prove that thoſe modes of the firſt figure, in which the major is particular, do not conclude, he proceeds thus:—"If A is or is not in "ſome B, and B in every C, no concluſion "follows. Take for the terms in the af- "firmative caſe, *good*, *habit*, *prudence*; in "the negative, *good*, *habit*, *ignorance*." This laconic ſtyle, the uſe of ſymbols not familiar, and, in place of giving an example, his leaving us to form one from three aſſigned terms, give ſuch embarraſſment to a reader, that he is like one reading a book of riddles.

Having thus aſcertained the true and falſe modes of a figure, he ſubjoins the particular rules of that figure, which ſeem to be deduced from the particular caſes before determined. The general rules come laſt of all, as a general corollary from what goes before.

I know not whether it is from a diffidence of Ariſtotle's demonſtrations, or from an apprehenſion of their obſcurity, or from a deſire of improving upon his method, that almoſt all the writers in logic I have met with have inverted his order, beginning where he ends, and ending where he begins. They firſt demonſtrate the general rules, which belong to all the figures, from three axioms; then, from the general rules and the nature of each figure, they demonſtrate the ſpecial rules of each figure. When this is done, nothing remains but to apply theſe general and ſpecial rules, and to reject every mode which contradicts them.

This method has a very ſcientific appearance; and when we conſider that, by a few rules once demonſtrated, an hundred and ſeventy-eight falſe modes are deſtroyed at one blow, which Ariſtotle had the trouble to put to death one by one, it ſeems to be a great improvement. I have only one objection to the three axioms.

The three axioms are theſe: 1. Things which agree with the ſame third agree with one another. 2. When one agrees with the third, and the other does not, they do not agree with one another. 3. When neither agrees with the third, you cannot thence conclude either that they do or do not agree with one another. If theſe axioms are applied to mathematical quantities, to which they ſeem to relate when taken literally, they have all the evidence that an axiom ought to have: but the logicians apply them in an analogical ſenſe to things of another nature. In order, therefore, to judge whether they are truly axioms, we ought to ſtrip them of their figurative dreſs, and to ſet them down in plain Engliſh, as the logicians underſtand them. They amount, therefore, to this: 1. If two things be affirmed of a third, or the third be affirmed of them; or if one be affirmed of the third, and the third affirmed of the other, then they may be affirmed one of the other. 2. If one is affirmed of

the third, or the third of it, and the other denied of the third, or the third of it, they may be denied one of the other. 3. If both are denied of the third, or the third of them, or if one is denied of the third, and the third denied of the other, nothing can be inferred.

When the three axioms are thus put in plain Engliſh, they ſeem not to have that degree of evidence which axioms ought to have; and if there is any defect of evidence in the axioms, this defect will be communicated to the whole edifice raiſed upon them.

It may even be ſuſpected that an attempt, by any method, to demonſtrate that a ſyllogiſm is concluſive, is an impropriety ſomewhat like that of attempting to demonſtrate an axiom. In a juſt ſyllogiſm, the connexion between the premiſes and the concluſion is not only real, but immediate; ſo that no propoſition can come between them to make their connexion more apparent. The very intention of a

ſyllogiſm is to leave nothing to be ſupplied that is neceſſary to a complete demonſtration. Therefore a man of common underſtanding, who has a perfect comprehenſion of the premiſes, finds himſelf under a neceſſity of admitting the concluſion, ſuppoſing the premiſes to be true; and the concluſion is connected with the premiſes with all the force of intuitive evidence. In a word, an immediate concluſion is ſeen in the premiſes by the light of common ſenſe; and, where that is wanting, no kind of reaſoning will ſupply its place.

SECT. V.

ON THIS THEORY, CONSIDERED AS AN ENGINE OF SCIENCE.

THE ſlow progreſs of uſeful knowledge, during the many ages in which the ſyllogiſtic art was moſt highly cultivated as the

only guide to ſcience, and its quick progreſs ſince that art was diſuſed, ſuggeſt a preſumption againſt it; and this preſumption is ſtrengthened by the puerility of the examples which have always been brought to illuſtrate its rules.

The ancients ſeem to have had too high notions, both of the force of the reaſoning power in man, and of the art of ſyllogiſm as its guide. Mere reaſoning can carry us but a very little way in moſt ſubjects. By obſervation, and experiments properly conducted, the ſtock of human knowledge may be enlarged without end; but the power of reaſoning alone, applied with vigour through a long life, would only carry a man round like a horſe in a mill, who labours hard, but makes no progreſs. There is indeed an exception to this obſervation in the mathematical ſciences. The relations of quantity are ſo various, and ſo ſuſceptible of exact menſuration, that long trains of accurate reaſoning on that ſubject may be formed, and concluſions drawn, very

remote from the firſt principles. It is in this ſcience, and thoſe which depend upon it, that the power of reaſoning triumphs; in other matters its trophies are inconſiderable. If any man doubt this, let him produce, in any ſubject unconnected with mathematics, a train of reaſoning of ſome length leading to a concluſion, which, without this train of reaſoning, would never have been brought within human ſight. Every man acquainted with mathematics can produce thouſands of ſuch trains of reaſoning. I do not ſay, that none ſuch can be produced in other ſciences; but I believe they are few, and not eaſily found; and that, if they are found, it will not be in ſubjects that can be expreſſed by categorical propoſitions, to which alone the theory of figure and mode extends.

In matters to which that theory extends, a man of good ſenſe, who can diſtinguiſh things that differ, who can avoid the ſnares of ambiguous words, and who is moderately practiſed in ſuch matters, ſees at once all

that can be inferred from the premiſes, or finds that there is but a very ſhort ſtep to the concluſion.

When the power of reaſoning is ſo feeble by nature, eſpecially in ſubjects to which this theory can be applied, it would be unreaſonable to expect great effects from it. And hence we ſee the reaſon why the examples brought to illuſtrate it by the moſt ingenious logicians have rather tended to bring it into contempt.

If it ſhould be thought that the ſyllogiſtic art may be an uſeful engine in mathematics, in which pure reaſoning has ample ſcope, firſt, it may be obſerved, That facts are unfavourable to this opinion: for it does not appear that Euclid, or Apollonius, or Archimedes, or Huygens, or Newton, ever made the leaſt uſe of this art; and I am even of opinion that no uſe can be made of it in mathematics. I would not wiſh to advance this raſhly, ſince Ariſtotle has ſaid that mathematicians reaſon for the moſt part in the firſt

figure. What led him to think ſo was, that the firſt figure only yields concluſions that are univerſal and affirmative, and the concluſions of mathematics are commonly of that kind. But it is to be obſerved, that the propoſitions of mathematics are not categorical propoſitions, conſiſting of one ſubject and one predicate. They expreſs ſome relation which one quantity bears to another, and on that account muſt have three terms. The quantities compared make two, and the relation between them is a third. Now, to ſuch propoſitions we can neither apply the rules concerning the converſion of propoſitions, nor can they enter into a ſyllogiſm of any of the figures or modes. We obſerved before that this converſion, *A is greater than B*, therefore *B is leſs than A*, does not fall within the rules of converſion given by Ariſtotle or the logicians; and we now add, that this ſimple reaſoning, *A is equal to B, and B to C*, therefore *A is equal to C*, cannot be brought into any ſyllogiſm in figure and

mode. There are, indeed, ſyllogiſms into which mathematical propoſitions may enter, and of ſuch we ſhall afterwards ſpeak; but they have nothing to do with the ſyſtem of figure and mode.

When we go without the circle of the mathematical ſciences, I know nothing in which there ſeems to be ſo much demonſtration as in that part of logic which treats of the figures and modes of ſyllogiſm; but the few remarks we have made ſhow that it has ſome weak places; and, beſides, this ſyſtem cannot be uſed as an engine to rear itſelf.

The compaſs of the ſyllogiſtic ſyſtem, as an engine of ſcience, may be diſcerned by a compendious and general view of the concluſion drawn, and the argument uſed to prove it, in each of the three figures.

In the firſt figure, the concluſion affirms or denies ſomething of a certain ſpecies or individual; and the argument to prove this concluſion is, that the ſame thing may be

affirmed or denied of the whole genus to which that ſpecies or individual belongs.

In the ſecond figure the concluſion is, That ſome ſpecies or individual does not belong to ſuch a genus; and the argument is, That ſome attribute common to the whole genus does not belong to that ſpecies or individual.

In the third figure, the concluſion is, That ſuch an attribute belongs to part of a genus; and the argument is, That the attribute in queſtion belongs to a ſpecies or individual which is part of that genus.

I apprehend, that, in this ſhort view, every concluſion that falls within the compaſs of the three figures, as well as the mean of proof, is comprehended. The rules of all the figures might be eaſily deduced from it; and it appears that there is only one principle of reaſoning in all the three; ſo that it is not ſtrange that a ſyllogiſm of one figure ſhould be reduced to one of another figure.

The general principle in which the

whole terminates, and of which every categorical ſyllogiſm is only a particular application, is this, That what is affirmed or denied of the whole genus may be affirmed or denied of every ſpecies and individual belonging to it. This is a principle of undoubted certainty indeed, but of no great depth. Ariſtotle and all the logicians aſſume it as an axiom, or firſt principle, from which the ſyllogiſtic ſyſtem, as it were, takes its departure; and after a tedious voyage, and great expenſe of demonſtration, it lands at laſt in this principle, as its ultimate concluſion, *O curas hominum! O quantum eſt in rebus inane!*

SECT. VI.

ON MODAL SYLLOGISMS.

CATEGORICAL propoſitions, beſides their quantity and quality, have another affection, by which they are divided into pure

and modal. In a pure propoſition, the predicate is barely affirmed or denied of the ſubject; but, in a modal propoſition, the affirmation or negation is modified, by being declared to be neceſſary, or contingent, or poſſible, or impoſſible. Theſe are the four modes obſerved by Ariſtotle, from which he denominates a propoſition modal. His genuine diſciples maintain that theſe are all the modes that can affect an affirmation or negation, and that the enumeration is complete. Others maintain that this enumeration is incomplete; and that, when an affirmation or negation is ſaid to be certain or uncertain, probable or improbable, this makes a modal propoſition, no leſs than the four modes of Ariſtotle. We ſhall not enter into this diſpute, but proceed to obſerve, that the epithets of *pure* and *modal* are applied to ſyllogiſms as well as to propoſitions. A pure ſyllogiſm is that in which both premiſes are pure propoſitions. A modal ſyl-

logiſm is that in which either of the premiſes is a modal propoſition.

The ſyllogiſms of which we have already ſaid ſo much are thoſe only which are pure as well as categorical. But when we conſider that, through all the figures and modes, a ſyllogiſm may have one premiſe modal of any of the four modes, while the other is pure, or it may have both premiſes modal, and that they may be either of the ſame mode or of different modes, what prodigious variety ariſes from all theſe combinations? Now, it is the buſineſs of a logician to ſhow how the concluſion is affected in all this variety of caſes. Ariſtotle has done this in his Firſt Analytics with immenſe labour; and it will not be thought ſtrange that, when he had employed only four chapters in diſcuſſing one hundred and ninety-two modes, true and falſe, of pure ſyllogiſms, he ſhould employ fifteen upon modal ſyllogiſms.

I am very willing to excuſe myſelf from entering upon this great branch of logic,

by the judgment and example of thoſe who cannot be charged either with want of reſpect to Ariſtotle, or with a low eſteem of the ſyllogiſtic art.

Keckerman, a famous Dantzican profeſſor, who ſpent his life in teaching and writing logic, in his huge folio ſyſtem of that ſcience publiſhed *anno* 1600, calls the doctrine of the modals the *crux logicorum.* With regard to the ſcholaſtic doctors, among whom this was a proverb, *De modalibus non guſtabit aſinus*, he thinks it very dubious whether they tortured moſt the modal ſyllogiſms, or were moſt tortured by them. But thoſe crabbed geniuſes, ſays he, made this doctrine ſo very thorny, that it is fitter to tear a man's wits in pieces than to give them ſolidity. He deſires it to be obſerved, that the doctrine of the modals is adapted to the Greek language. The modal terms were frequently uſed by the Greeks in their diſputations, and, on that account, are ſo fully handled by Ariſtotle: but, in the

Latin tongue, you ſhall hardly ever meet with them. Nor do I remember, in all my experience, ſays he, to have obſerved any man in danger of being foiled in a diſpute through his ignorance of the modals.

This author, however, out of reſpect to Ariſtotle, treats pretty fully of modal propoſitions, ſhowing how to diſtinguiſh their ſubject and predicate, their quantity and quality. But the modal ſyllogiſms he paſſes over altogether.

Ludovicus Vives, whom I mention, not as a devotee of Ariſtotle, but on account of his own judgment and learning, thinks that the doctrine of modals ought to be baniſhed out of logic, and remitted to grammar; and that if the grammar of the Greek tongue had been brought to a ſyſtem in the time of Ariſtotle, that moſt acute philoſopher would have ſaved the great labour he has beſtowed on this ſubject.

Burgerſdick, after enumerating five claſſes of modal ſyllogiſms, obſerves, that they require many rules and cautions, which

Ariſtotle hath handled diligently; but that, as the uſe of them is not great, and their rules difficult, he thinks it not worth while to enter into the diſcuſſion of them; recommending to thoſe who would underſtand them, the moſt learned paraphraſe of Joannes Monlorius upon the firſt book of the Firſt Analytics.

All the writers of logic for two hundred years back, that have fallen into my hands, have paſſed over the rules of modal ſyllogiſms with as little ceremony. So that this great branch of the doctrine of ſyllogiſm, ſo diligently handled by Ariſtotle, fell into neglect, if not contempt, even while the doctrine of pure ſyllogiſms continued in the higheſt eſteem. Moved by theſe authorities, I ſhall let this doctrine reſt in peace, without giving the leaſt diſturbance to its aſhes.

SECT. VII.

ON SYLLOGISMS THAT DO NOT BELONG TO FIGURE AND MODE.

ARISTOTLE gives ſome obſervations upon imperfect ſyllogiſms; ſuch as the Enthimema, in which one of the premiſes is not expreſſed, but underſtood; Induction, wherein we collect an univerſal from a full enumeration of particulars; and Examples, which are an imperfect induction. The logicians have copied Ariſtotle, upon theſe kinds of reaſoning, without any conſiderable improvement. But to compenſate the modal ſyllogiſms, which they have laid aſide, they have given rules for ſeveral kinds of ſyllogiſm of which Ariſtotle takes no notice. Theſe may be reduced to two claſſes.

The firſt claſs comprehends the ſyllogiſms into which any excluſive reſtrictive exception, or reduplicative propoſition, en-

ters. Such propoſitions are by ſome called *exponible*, by others *imperfectly modal*. The rules given with regard to theſe are obvious, from a juſt interpretation of the propoſitions.

The ſecond claſs is that of hypothetical ſyllogiſms, which take that denomination from having a hypothetical propoſition for one or both premiſes. Moſt logicians give the name of *hypothetical* to all complex propoſitions which have more terms than one ſubject and one predicate. I uſe the word in this large ſenſe, and mean, by hypothetical ſyllogiſms, all thoſe in which either of the premiſes conſiſt of more terms than two. How many various kinds there may be of ſuch ſyllogiſms, has never been aſcertained. The logicians have given names to ſome; ſuch as the copulative, the conditional, by ſome called hypothetical, and the disjunctive.

Such ſyllogiſms cannot be tried by the rules of figure and mode. Every kind would require rules peculiar to itſelf. Lo-

gicians have given rules for ſome kinds; but there are many that have not ſo much as a name.

The Dilemma is conſidered by moſt logicans as a ſpecies of the disjunctive ſyllogiſm. A remarkable property of this kind is, that it may ſometimes be happily retorted: it is, it ſeems, like a hand grenade, which, by dexterous management, may be thrown back ſo as to ſpend its force upon the aſſailant. We ſhall conclude this tedious account of ſyllogiſms with a dilemma mentioned by A. Gellius, and from him by many logicians, as inſoluble in any other way.

"Euathlus, a rich young man, deſirous of learning the art of pleading, applied to Protagoras, a celebrated ſophiſt, to inſtruct him, promiſing a great ſum of money as his reward, one half of which was paid down, the other half he bound himſelf to pay as ſoon as he ſhould plead a cauſe before the judges, and gain it. Protagoras

found him a very apt ſcholar; but, after he had made good progreſs, he was in no haſte to plead cauſes. The maſter, conceiving that he intended by this means to ſhift off his ſecond payment, took, as he thought, a ſure method to get the better of his delay. He ſued Euathlus before the judges, and, having opened his cauſe at the bar, he pleaded to this purpoſe: O moſt fooliſh young man, do you not ſee that, in any event, I muſt gain my point? for if the judges give ſentence for me, you muſt pay by their ſentence; if againſt me, the condition of our bargain is fulfilled, and you have no plea left for your delay, after having pleaded and gained a cauſe. To which Euathlus anſwered: O moſt wiſe maſter, I might have avoided the force of your argument by not pleading my own cauſe. But, giving up this advantage, do you not ſee that, whatever ſentence the judges paſs, I am ſafe? If they give ſentence for me, I am acquitted by their ſentence; if

againſt me, the condition of our bargain is not fulfilled, by my pleading a cauſe and loſing it. The judges, thinking the arguments unanſwerable on both ſides, put off the cauſe to a long day."

CHAP. V.

ACCOUNT OF THE REMAINING BOOKS OF THE ORGANON.

SECT. I.

OF THE LAST ANALYTICS.

In the Firſt Analytics, ſyllogiſms are conſidered in reſpect of their form; they are now to be conſidered in reſpect of their matter. The form lies in the neceſſary connexion between the premiſes and the concluſion; and where ſuch a connexion is wanting, they are ſaid to be informal, or vicious in point of form.

But where there is no fault in the form, there may be in the matter; that is, in the propoſitions of which they are compoſed,

which may be true or falſe, probable or improbable.

When the premiſes are certain, and the concluſion drawn from them in due form, this is demonſtration, and produces ſcience. Such ſyllogiſms are called *apodictical*, and are handled in the two books of the Laſt Analytics. When the premiſes are not certain, but probable only, ſuch ſyllogiſms are called *dialectical*; and of them he treats in the eight books of the Topics. But there are ſome ſyllogiſms which ſeem to be perfect both in matter and form, when they are not really ſo; as a face may ſeem beautiful which is but painted. Theſe being apt to deceive, and produce a falſe opinion, are called *ſophiſtical*; and they are the ſubject of the book concerning Sophiſms.

To return to the Laſt Analytics, which treat of demonſtration and of ſcience: We ſhall not pretend to abridge theſe books, for Ariſtotle's writings do not admit of abridgment: no man, in fewer words, can

ſay what he ſays; and he is not often guilty of repetition. We ſhall only give ſome of his capital concluſions, omitting his long reaſonings and nice diſtinctions, of which his genius was wonderfully productive.

All demonſtration muſt be built upon principles already known, and theſe upon others of the ſame kind, until we come at laſt to firſt principles, which neither can be demonſtrated, nor need to be, being evident of themſelves.

We cannot demonſtrate things in a circle, ſupporting the concluſion by the premiſes, and the premiſes by the concluſion. Nor can there be an infinite number of middle terms between the firſt principle and the concluſion.

In all demonſtration, the firſt principles, the concluſion, and all the intermediate propoſitions, muſt be neceſſary, general, and eternal truths; for, of things fortuitous, contingent, or mutable, or of individual things, there is no demonſtration.

Some demonſtrations prove only that the thing is thus affected; others prove why it is thus affected. The former may be drawn from a remote cauſe, or from an effect; but the latter muſt be drawn from an immediate cauſe, and are the moſt perfect.

The firſt figure is beſt adapted to demonſtration, becauſe it affords concluſions univerſally affirmative; and this figure is commonly uſed by the mathematicians.

The demonſtration of an affirmative propoſition is preferable to that of a negative, the demonſtration of an univerſal to that of a particular, and direct demonſtration to that *ad abſurdum*.

The principles are more certain than the concluſion.

There cannot be opinion and ſcience of the ſame thing at the ſame time.

In the ſecond book we are taught, that the queſtions that may be put with regard to any thing are four: 1. Whether the thing be thus affected. 2. Why it is thus

affected. 3. Whether it exiſts. 4. What it is.

The laſt of theſe queſtions Ariſtotle, in good Greek, calls the *What is it* of a thing. The ſchoolmen, in very barbarous Latin, called this the *quiddity* of a thing. This quiddity, he proves by many arguments, cannot be demonſtrated, but muſt be fixed by a definition. This gives occaſion to treat of definition, and how a right definition ſhould be formed. As an example, he gives a definition of the number *three*, and defines it to be the firſt odd number.

In this book he treats alſo of the four kinds of cauſes; efficient, material, formal, and final.

Another thing treated of in this book is, the manner in which we acquire firſt principles, which are the foundation of all demonſtration. Theſe are not innate, becauſe we may be for a great part of life ignorant of them; nor can they be deduced demonſtratively from any antecedent knowledge, otherwiſe they would not be firſt

principles. Therefore he concludes, that firſt principles are got by induction from the informations of ſenſe. The ſenſes give us informations of individual things, and from theſe by induction we draw general concluſions: for it is a maxim with Ariſtotle, That there is nothing in the underſtanding which was not before in ſome ſenſe.

The knowledge of firſt principles, as it is not acquired by demonſtration, ought not to be called ſcience, and therefore he calls it *intelligence*.

SECT. II.

OF THE TOPICS.

THE profeſſed deſign of the Topics is, to ſhow a method by which a man may be able to reaſon with probability and conſiſtency upon every queſtion that can occur.

Every queſtion is either about the genus of the ſubject, or its ſpecific difference, or ſomething proper to it, or ſomething accidental.

To prove that this diviſion is complete, Ariſtotle reaſons thus: Whatever is attributed to a ſubject, it muſt either be, that the ſubject can be reciprocally attributed to it, or that it cannot. If the ſubject and attribute can be reciprocated, the attribute either declares what the ſubject is, and then it is a definition, or it does not declare what the ſubject is, and then it is a property. If the attribute cannot be reciprocated, it muſt be ſomething contained in the definition, or not. If it be contained in the definition of the ſubject, it muſt be the genus of the ſubject, or its ſpecific difference; for the definition conſiſts of theſe two. If it be not contained in the definition of the ſubject, it muſt be an accident.

The furniture proper to fit a man for arguing dialectically may be reduced to theſe four heads: 1. Probable propoſitions of all

ſorts, which may on occaſion be aſſumed in an argument. 2. Diſtinctions of words which are nearly of the ſame ſignification. 3. Diſtinctions of things which are not ſo far aſunder but that they may be taken for one and the ſame. 4. Similitudes.

The ſecond and the five following books are taken up in enumerating the topics or heads of argument that may be uſed in queſtions about the genus, the definition, the properties, and the accidents of a thing; and occaſionally he introduces the topics for proving things to be the ſame or different, and the topics for proving one thing to be better or worſe than another.

In this enumeration of topics, Ariſtotle has ſhown more the fertility of his genius than the accuracy of method. The writers of logic ſeem to be of this opinion: for I know none of them that has followed him cloſely upon this ſubject. They have conſidered the topics of argumentation as reducible to certain axioms. For inſtance, when the queſtion is about the genus of a

thing, it muſt be determined by ſome axiom about genus and ſpecies; when it is about a definition, it muſt be determined by ſome axiom relating to definition, and things defined; and ſo of other queſtions. They have therefore reduced the doctrine of the topics to certain axioms or canons, and diſpoſed theſe axioms in order under certain heads.

This method ſeems to be more commodious and elegant than that of Ariſtotle. Yet it muſt be acknowledged that Ariſtotle has furniſhed the materials from which all the logicians have borrowed their doctrine of topics; and even Cicero, Quintilian, and other rhetorical writers, have been much indebted to the topics of Ariſtotle.

He was the firſt, as far as I know, who made an attempt of this kind; and in this he acted up to the magnanimity of his own genius, and that of ancient philoſophy. Every ſubject of human thought had been reduced to ten categories, every thing that can be attributed to any ſubject to five

predicables: he attempted to reduce all the forms of reaſoning to fixed rules of figure and mode, and to reduce all the topics of argumentation under certain heads; and by that means to collect, as it were, into one ſtore all that can be ſaid on one ſide or the other of every queſtion, and to provide a grand arſenal, from which all future combatants might be furniſhed with arms offenſive and defenſive in every cauſe, ſo as to leave no room to future generations to invent any thing new.

The laſt book of the Topics is a code of the laws according to which a ſyllogiſtical diſputation ought to be managed, both on the part of the aſſailant and defendant: From which it is evident that this philoſopher trained his diſciples to contend, not for truth merely, but for victory.

SECT. III.

OF THE BOOK CONCERNING SOPHISMS.

A SYLLOGISM which leads to a falſe concluſion muſt be vicious either in matter or form, for from true principles nothing but truth can be juſtly deduced. If the matter be faulty, that is, if either of the premiſes be falſe, that premiſe muſt be denied by the defendant. If the form be faulty, ſome rule of ſyllogiſm is tranſgreſſed, and it is the part of the defendant to ſhow what general or ſpecial rule it is that is tranſgreſſed; ſo that, if he be an able logician, he will be impregnable in the defence of truth, and may reſiſt all the attacks of the ſophiſt. But as there are ſyllogiſms which may ſeem to be perfect both in matter and form, when they are not really ſo, as a piece of money may ſeem to be good coin when it is adulterate, ſuch

fallacious ſyllogiſms are conſidered in this treatiſe, in order to make a defendant more expert in the uſe of his defenſive weapons.

And here the author, with his uſual magnanimity, attempts to bring all the fallacies that can enter into a ſyllogiſm under thirteen heads, of which ſix lie in the diction or language, and ſeven not in the diction.

The fallacies in diction are, 1. When an ambiguous word is taken at one time in one ſenſe, and at another time in another. 2. When an ambiguous phraſe is taken in the ſame manner. 3. and 4. Are ambiguities in ſyntax; when words are conjoined in ſyntax that ought to be diſjoined, or disjoined when they ought to be conjoined. 5. Is an ambiguity in proſody, accent, or pronunciation. 6. An ambiguity ariſing from ſome figure of ſpeech.

When a ſophiſm of any of theſe kinds is tranſlated into another language, or even

rendered into unambiguous expreſſions in the ſame language, the fallacy is evident, and the ſyllogiſm appears to have four terms.

The ſeven fallacies which are ſaid not to be in the diction, but in the thing, have their proper names in Greek and in Latin, by which they are diſtinguiſhed. Without minding their names, we ſhall give a brief account of their nature.

1. The firſt is, taking an accidental conjunction of things for a natural or neceſſary connexion; as, when from an accident we infer a property; when from an example we infer a rule; when from a ſingle act we infer a habit.

2. Taking that abſolutely which ought to be taken comparatively, or with a certain limitation. The conſtruction of language often leads into this fallacy; for, in all languages, it is common to uſe abſolute terms to ſignify things that carry in them ſome ſecret compariſon, or to uſe unlimited

terms to ſignify what from its nature muſt be limited.

3. Taking that for the cauſe of a thing which is only an occaſion or concomitant.

4. Begging the queſtion. This is done when the thing to be proved, or ſomething equivalent, is aſſumed in the premiſes.

5. Miſtaking the queſtion. When the concluſion of the ſyllogiſm is not the thing that ought to be proved, but ſomething elſe that is miſtaken for it.

6. When that which is not a conſequence is miſtaken for a conſequence; as if, becauſe all Africans are black, it were taken for granted that all blacks are Africans.

7. The laſt fallacy lies in propoſitions that are complex, and imply two affirmations, whereof one may be true, and the other falſe; ſo that, whether you grant the propoſition or deny it, you are entangled: as when it is affirmed that ſuch a man has left off playing the fool. If it be granted,

it implies that he did play the fool formerly. If it be denied, it implies, or ſeems to imply, that he plays the fool ſtill.

In this enumeration we ought, in juſtice to Ariſtotle, to expect only the fallacies incident to categorical ſyllogiſms. And I do not find that the logicians have made any additions to it when taken in this view; although they have given ſome other fallacies that are incident to ſyllogiſms of the hypothetical kind, particularly the fallacy of an incomplete enumeration in disjunctive ſyllogiſms and dilemmas.

The different ſpecies of ſophiſms above-mentioned are not ſo preciſely defined by Ariſtotle, or by ſubſequent logicians, but that they allow of great latitude in the application; and it is often dubious under what particular ſpecies a ſophiſtical ſyllogiſm ought to be claſſed. We even find the ſame example brought under one ſpecies by one author, and under another

ſpecies by another. Nay, what is more ſtrange, Ariſtotle himſelf employs a long chapter in proving, by a particular induction, that all the ſeven may be brought under that which we have called *miſtaking the queſtion*, and which is commonly called *ignoratio elenchi*. And indeed the proof of this is eaſy, without that laborious detail which Ariſtotle uſes for the purpoſe: for if you lop off from the concluſion of a ſophiſtical ſyllogiſm all that is not ſupported by the premiſes, the concluſion in that caſe will always be found different from that which ought to have been proved; and ſo it falls under the *ignoratio elenchi*.

It was probably Ariſtotle's aim to reduce all the poſſible variety of ſophiſms, as he had attempted to do of juſt ſyllogiſms, to certain definite ſpecies: but he ſeems to be ſenſible that he had fallen ſhort in this laſt attempt. When a genus is properly divided into its ſpecies, the ſpecies ſhould not only, when taken together, exhauſt the whole genus, but every

ſpecies ſhould have its own precinct ſo accurately defined that one ſhall not encroach upon another. And when an individual can be ſaid to belong to two or three different ſpecies, the diviſion is imperfect; yet this is the caſe with Ariſtotle's diviſion of the ſophiſms, by his own acknowledgement. It ought not, therefore, to be taken for a diviſion ſtrictly logical. It may rather be compared to the ſeveral ſpecies or forms of action invented in law for the redreſs of wrongs. For every wrong there is a remedy in law by one action or another; but ſometimes a man may take his choice among ſeveral different actions. So every ſophiſtical ſyllogiſm may, by a little art, be brought under one or other of the ſpecies mentioned by Ariſtotle, and very often you may take your choice of two or three.

Beſides the enumeration of the various kinds of ſophiſms, there are many other things in this treatiſe concerning the art of managing a ſyllogiſtical diſpute with an

antagoniſt. And indeed, if the paſſion for this kind of litigation, which reigned for ſo many ages, ſhould ever again lift up its head, we may predict that the Organon of Ariſtotle will then become a faſhionable ſtudy; for it contains ſuch admirable materials and documents for this art, that he may be ſaid to have brought it to a ſcience.

The concluſion of this treatiſe ought not to be overlooked; it manifeſtly relates, not to the preſent treatiſe only, but alſo to the whole analytics and topics of the author. I ſhall therefore give the ſubſtance of it.

"Of thoſe who may be called inventors, ſome have made important additions to things long before begun and carried on through a courſe of ages; others have given a ſmall beginning to things which, in ſucceeding times, will be brought to greater perfection. The beginning of a thing, though ſmall, is the chief part of it, and requires the greateſt degree of inven-

tion; for it is eaſy to make additions to inventions once begun. Now, with regard to the dialectical art, there was not ſomething done, and ſomething remaining to be done. There was abſolutely nothing done: for thoſe who profeſſed the art of diſputation had only a ſet of orations compoſed, and of arguments, and of captious queſtions, which might ſuit many occaſions. Theſe their ſcholars ſoon learned, and fitted to the occaſion. This was not to teach you the art, but to furniſh you with the materials produced by the art: as if a man profeſſing to teach you the art of making ſhoes ſhould bring you a parcel of ſhoes of various ſizes and ſhapes, from which you may provide thoſe who want. This may have its uſe, but it is not to teach the art of making ſhoes. And indeed, with regard to rhetorical declamation, there are many precepts handed down from ancient times; but, with regard to the conſtruction of ſyllogiſms, not one.

"We have, therefore, employed much time and labour upon this ſubject; and if our ſyſtem appear to you not to be in the number of thoſe things which, being before carried a certain length, were left to be perfected, we hope for your favourable acceptance of what is done, and your indulgence in what is left imperfect."

CHAP. V.

REFLECTIONS ON THE UTILITY OF LOGIC, AND THE MEANS OF ITS IMPROVEMENT.

SECT. I.

OF THE UTILITY OF LOGIC.

MEN rarely leave one extreme without running into the contrary. It is no wonder, therefore, that the exceſſive admiration of Ariſtotle, which continued for ſo many ages, ſhould end in an undue contempt, and that the high eſteem of logic, as the grand engine of ſcience, ſhould at laſt make way for too unfavourable an opinion, which ſeems now prevalent, of its being unworthy of a place in a liberal education. Thoſe who think according to the faſhion,

as the greateſt part of men do, will be as prone to go into this extreme as their grandfathers were to go into the contrary.

Laying aſide prejudice, whether faſhionable or unfaſhionable, let us conſider whether logic is or may be made ſubſervient to any good purpoſe. Its profeſſed end is, to teach men to think, to judge, and to reaſon, with preciſion and accuracy. No man will ſay that this is a matter of no importance; the only thing, therefore, that admits of doubt is, whether it can be taught.

To reſolve this doubt, it may be obſerved, that our rational faculty is the gift of God, given to men in very different meaſure. Some have a large portion, ſome a leſs; and where there is a remarkable defect of the natural power, it cannot be ſupplied by any culture. But this natural power, even where it is the ſtrongeſt, may lie dead for want of the means of improvement: a ſavage may have been born with as good faculties as a Bacon or a Newton:

but his talent was buried, being never put to uſe; while theirs was cultivated to the beſt advantage.

It may likewiſe be obſerved, that the chief mean of improving our rational power is the vigorous exerciſe of it in various ways and in different ſubjects, by which the habit is acquired of exerciſing it properly. Without ſuch exerciſe, and good ſenſe over and above, a man who has ſtudied logic all his life may, after all, be only a petulant wrangler, without true judgment or ſkill of reaſoning in any ſcience.

I take this to be Locke's meaning, when, in his Thoughts on Education, he ſays, "If you would have your ſon to reaſon well, let him read Chillingworth." The ſtate of things is much altered ſince Locke wrote. Logic has been much improved, chiefly by his writings; and yet much leſs ſtreſs is laid upon it, and leſs time conſumed in it. His counſel, therefore, was judicious and ſeaſonable, viz. That the improvement

of our reaſoning power is to be expected much more from an intimate acquaintance with the authors who reaſon the beſt, than from ſtudying voluminous ſyſtems of logic. But if he had meant that the ſtudy of logic was of no uſe, nor deſerved any attention, he ſurely would not have taken the pains to have made ſo conſiderable an addition to it by his *Eſſay on the Human Underſtanding*, and by his *Thoughts on the Conduct of the Underſtanding*. Nor would he have remitted his pupil to Chillingworth, the acuteſt logician as well as the beſt reaſoner of his age, and one who, in innumerable places of his excellent book, without pedantry even in that pedantic age, makes the happieſt application of the rules of logic for unravelling the ſophiſtical reaſoning of his antagoniſt.

Our reaſoning power makes no appearance in infancy, but, as we grow up, it unfolds itſelf by degrees like the bud of a tree. When a child firſt draws an inference, or perceives the force of an inference

drawn by another, we may call this *the birth of his reaſon:* but it is yet like a new-born babe, weak and tender; it muſt be cheriſhed, carried in arms, and have food of eaſy digeſtion, till it gather ſtrength.

I believe no man remembers the birth of his reaſon; but it is probable that his deciſions are at firſt weak and wavering, and, compared with that ſteady conviction which he acquires in ripe years, are like the dawn of the morning compared with noon-day. We ſee that the reaſon of children yields to authority, as a reed to the wind; nay, that it clings to it, and leans upon it, as if conſcious of its own weakneſs.

When reaſon acquires ſuch ſtrength as to ſtand on its own bottom, without the aid of authority, or even in oppoſition to authority, this may be called its *manly age*. But, in moſt men, it hardly ever arrives at this period. Many, by their ſituation in life, have not the opportunity of cultivating their rational powers. Many, from the habit they have acquired of ſubmitting

their opinions to the authority of others, or from ſome other principle which operates more powerfully than the love of truth, ſuffer their judgment to be carried along to the end of their days, either by the authority of a leader, or of a party, or of the multitude, or by their own paſſions. Such perſons, however learned, however acute, may be ſaid to be all their days children in underſtanding. They reaſon, they diſpute, and perhaps write; but it is not that they may find the truth, but that they may defend opinions which have deſcended to them by inheritance, or into which they have fallen by accident, or been led by affection.

I agree with Mr Locke, that there is no ſtudy better fitted to exerciſe and ſtrengthen the reaſoning powers, than that of the mathematical ſciences for two reaſons; firſt, Becauſe there is no other branch of ſcience which gives ſuch ſcope to long and accurate trains of reaſoning; and, ſecondly, Becauſe, in mathematics, there is no room

for authority, nor for prejudice of any kind, which may give a falſe bias to the judgment.

When a youth of moderate parts begins to ſtudy Euclid, every thing at firſt is new to him. His apprehenſion is unſteady; his judgment is feeble, and reſts partly upon the evidence of the thing, and partly upon the authority of his teacher. But, every time he goes over the definitions, the axioms, the elementary propoſitions, more light breaks in upon him; the language becomes familiar, and conveys clear and ſteady conceptions; the judgment is confirmed; he begins to ſee what demonſtration is, and it is impoſſible to ſee it without being charmed with it. He perceives it to be a kind of evidence that has no need of authority to ſtrengthen it. He finds himſelf emancipated from that bondage, and exults ſo much in this new ſtate of independence, that he ſpurns at authority, and would have demonſtration for every thing, until experience teaches him that

this is a kind of evidence that cannot be had in moſt things, and that, in his moſt important concerns, he muſt reſt contented with probability.

As he goes on in mathematics, the road to demonſtration becomes ſmooth and eaſy; he can walk in it firmly, and take wider ſteps, and at laſt he acquires the habit not only of underſtanding a demonſtration, but of diſcovering and demonſtrating mathematical truths.

Thus a man, without rules of logic, may acquire a habit of reaſoning juſtly in mathematics; and I believe he may, by like means, acquire a habit of reaſoning juſtly in mechanics, in juriſprudence, in politics, or in any other ſcience. Good ſenſe, good examples, and aſſiduous exerciſe, may bring a man to reaſon juſtly and acutely in his own profeſſion without rules.

But if any man think that, from this conceſſion, he may infer the inutility of logic, he betrays a great want of that art

by this inference; for it is no better reaſoning than this, That becauſe a man may go from Edinburgh to London by the way of Paris, therefore any other road is uſeleſs.

There is perhaps no practical art which may not be acquired, in a very conſiderable degree, by example and practice, without reducing it to rules. But practice joined with rules may carry a man on in his art farther and more quickly than practice without rules. Every ingenious artiſt knows the utility of having his art reduced to rules, and by that means made a ſcience. He is thereby enlightened in his practice, and works with more aſſurance. By rules he ſometimes corrects his own errors, and often detects the errors of others; he finds them of great uſe to confirm his judgment, to juſtify what is right, and to condemn what is wrong.

Is it of no uſe in reaſoning to be well acquainted with the various powers of the human underſtanding, by which we reaſon?

Is it of no uſe to reſolve the various kinds of reaſoning into their ſimple elements, and to diſcover, as far as we are able, the rules by which theſe elements are combined in judging and in reaſoning? Is it of no uſe to mark the various fallacies in reaſoning, by which even the moſt ingenious men have been led into error? It muſt ſurely betray great want of underſtanding to think theſe things uſeleſs or unimportant. Theſe are the things which logicians have attempted, and which they have executed; not indeed ſo completely as to leave no room for improvement, but in ſuch a manner as to give very conſiderable aid to our reaſoning powers. That the principles laid down with regard to definition and diviſion, with regard to the converſion and oppoſition of propoſitions, and the general rules of reaſoning, are not without uſe, is ſufficiently apparent from the blunders committed by thoſe who diſdain any acquaintance with them.

Although the art of categorical ſyllogiſm is better fitted for ſcholaſtic litigation than for real improvement in knowledge, it is a venerable piece of antiquity, and a great effort of human genius. We admire the pyramids of Egypt and the wall of China, though uſeleſs burdens upon the earth: we can bear the moſt minute deſcription of them, and travel hundreds of leagues to ſee them: if any perſon ſhould, with ſacrilegious hands, deſtroy or deface them, his memory would be had in abhorrence. The predicaments and predicables, the rules of ſyllogiſm, and the topics, have a like title to our veneration as antiquities; they are uncommon efforts, not of human power, but of human genius, and they make a remarkable period in the progreſs of human reaſon.

The prejudice againſt logic has probably been ſtrengthened by its being taught too early in life. Boys are often taught logic as they are taught their creed, when it is an exerciſe of memory only, without

underſtanding. One may as well expect to underſtand grammar before he can ſpeak, as to underſtand logic before he can reaſon. It muſt even be acknowledged, that commonly we are capable of reaſoning in mathematics more early than in logic. The objects preſented to the mind in this ſcience are of a very abſtract nature, and can be diſtinctly conceived only when we are capable of attentive reflection upon the operations of our own underſtanding, and after we have been accuſtomed to reaſon. There may be an elementary logic, level to the capacities of thoſe who have been but little exerciſed in reaſoning; but the moſt important parts of this ſcience require a ripe underſtanding, capable of reflecting upon its own operations. Therefore, to make logic the firſt branch of ſcience that is to be taught, is an old error that ought to be corrected.

SECT. II.

ON THE IMPROVEMENT OF LOGIC.

In compoſitions of human thought, expreſſed by ſpeech or by writing, whatever is excellent and whatever is faulty fall within the province either of grammar, or of rhetoric, or of logic. Propriety of expreſſion is the province of grammar; grace, elegance, and force, in thought and in expreſſion, are the province of rhetoric; juſtneſs and accuracy of thought are the province of logic.

The faults in compoſition, therefore, which fall under the cenſure of logic, are obſcure and indiſtinct conceptions, falſe judgment, inconcluſive reaſoning, and all improprieties in diſtinctions, definitions, diviſion, or method. To aid our rational powers in avoiding theſe faults, and in attaining the oppoſite excellencies, is the end

of logic; and whatever there is in it that has no tendency to promote this end ought to be thrown out.

The rules of logic, being of a very abſtract nature, ought to be illuſtrated by a variety of real and ſtriking examples taken from the writings of good authors. It is both inſtructive and entertaining to obſerve the virtues of accurate compoſition in writers of fame; we cannot ſee them without being drawn to the imitation of them, in a more powerful manner than we can be by dry rules. Nor are the faults of ſuch writers leſs inſtructive or leſs powerful monitors. A wreck left upon a ſhoal, or upon a rock, is not more uſeful to the ſailor than the faults of good writers, when ſet up to view, are to thoſe who come after them. It was a happy thought in a late ingenious writer of Engliſh grammar to collect under the ſeveral rules examples of bad Engliſh found in the moſt approved authors. It were to be wiſhed that the rules of logic were illuſtrated in

the ſame manner. By theſe means a ſyſtem of logic would become a repoſitory, wherein whatever is moſt acute in judging and in reaſoning, whatever is moſt accurate in dividing, diſtinguiſhing, and defining, ſhould be laid up and diſpoſed in order for our imitation, and wherein the falſe ſteps of eminent authors ſhould be recorded for our admonition.

After men had laboured in the ſearch of truth near two thouſand years by the help of ſyllogiſms, Lord Bacon propoſed the method of induction, as a more effectual engine for that purpoſe. His *Novum Organum* gave a new turn to the thoughts and labours of the inquiſitive, more remarkable and more uſeful than that which the *Organum* of Ariſtotle had given before, and may be conſidered as a ſecond grand era in the progreſs of human reaſon.

The art of ſyllogiſm produced numberleſs diſputes, and numberleſs ſects who fought againſt each other with much ani-

moſity, without gaining or loſing ground, but did nothing conſiderable for the benefit of human life. The art of induction, firſt delineated by Lord Bacon, produced numberleſs laboratories and obſervatories, in which nature has been put to the queſtion by thouſands of experiments, and forced to confeſs many of her ſecrets that before were hid from mortals; and, by theſe, arts have been improved, and human knowledge wonderfully increaſed.

In reaſoning by ſyllogiſm from general principles, we deſcend to a concluſion virtually contained in them. The proceſs of induction is more arduous, being an aſſent from particular premiſes to a general concluſion. The evidence of ſuch general concluſions is probable only, not demonſtrative; but when the induction is ſufficiently copious, and carried on according to the rules of art, it forces conviction no leſs than demonſtration itſelf does.

The greateſt part of human knowledge reſts upon evidence of this kind. Indeed,

we can have no other for general truths which are contingent in their nature, and depend upon the will and ordination of the Maker of the world. He governs the world he has made by general laws: the effects of these laws in particular phenomena are open to our observation; and, by observing a train of uniform effects with due caution, we may at last decypher the law of nature by which they are regulated.

Lord Bacon has displayed no less force of genius in reducing to rules this method of reasoning than Aristotle did in the method of syllogism. His *Novum Organum* ought therefore to be held as a most important addition to the ancient logic. Those who understand it, and enter into its spirit, will be able to distinguish the chaff from the wheat in philosophical disquisitions into the works of God. They will learn to hold in due contempt all hypotheses and theories, the creatures of human imagination, and to respect nothing but facts

ſufficiently vouched, or concluſions drawn from them by a fair and chaſte interpretation of nature.

Moſt arts have been reduced to rules, after they had been brought to a conſiderable degree of perfection by the natural ſagacity of artiſts, and the rules have been drawn from the beſt examples of the art that had been before exhibited: but the art of philoſophical induction was delineated by Lord Bacon in a very ample manner before the world had ſeen any tolerable example of it. This, although it adds greatly to the merit of the author, muſt have produced ſome obſcurity in the work, and a defect of proper examples for illuſtration. This defect may now be eaſily ſupplied from thoſe authors who, in their philoſophical diſquiſitions, have the moſt ſtrictly purſued the path pointed out in the *Novum Organum*. Among theſe Sir Iſaac Newton appears to hold the firſt rank, having, in the third book of his *Principia*, and in his Optics, had the rules

of the *Novum Organum* conſtantly in his eye.

I think Lord Bacon was alſo the firſt who endeavoured to reduce to a ſyſtem the prejudices or biaſſes of the mind, which are the cauſes of falſe judgment, and which he calls *the idols of the human underſtanding.* Some late writers of logic have very properly introduced this into their ſyſtem; but it deſerves to be more copiouſly handled, and to be illuſtrated by real examples.

It is of great conſequence to accurate reaſoning to diſtinguiſh firſt principles, which are to be taken for granted, from propoſitions which require proof. All the real knowledge of mankind may be divided into two parts; the firſt conſiſting of ſelf-evident propoſitions, the ſecond, of thoſe which are deduced by juſt reaſoning from ſelf-evident propoſitions. The line that divides theſe two parts ought to be marked as diſtinctly as poſſible, and the principles that are ſelf-evident reduced, as far as can be done, to general axioms. This has been

done in mathematics from the beginning, and has tended greatly to the advancement of that ſcience. It has lately been done in natural philoſophy, and by this means that ſcience has advanced more in an hundred and fifty years than it had done before in two thouſand. Every ſcience is in an unformed ſtate until its firſt principles are aſcertained; after which it advances regularly, and ſecures the ground it has gained.

Although firſt principles do not admit of direct proof, yet there muſt be certain marks and characters by which thoſe that are truly ſuch may be diſtinguiſhed from counterfeits. Theſe marks ought to be deſcribed and applied, to diſtinguiſh the genuine from the ſpurious.

In the ancient philoſophy there is a redundance rather than a defect of firſt principles. Many things were aſſumed under that character without a juſt title: That nature abhors a *vacuum*; that bodies do not gravitate in their proper place; that the heavenly bodies undergo no change;

That they move in perfect circles, and with an equable motion. Such principles as theſe were aſſumed in the Peripatetic philoſophy without proof, as if they were ſelf-evident.

Des Cartes, ſenſible of this weakneſs in the ancient philoſophy, and deſirous to guard againſt it in his own ſyſtem, reſolved to admit nothing until his aſſent was forced by irreſiſtible evidence. The firſt thing that he found to be certain and evident was, that he thought, and reaſoned, and doubted. He found himſelf under a neceſſity of believing the exiſtence of thoſe mental operations of which he was conſcious; and having thus found ſure footing in this one principle of conſciouſneſs, he reſted ſatisfied with it, hoping to be able to build the whole fabric of his knowledge upon it, like Archimedes, who wanted but one fixed point to move the whole earth. But the foundation was too narrow, and in his progreſs he unawares aſſumes many things leſs evident than thoſe which he attempts

to prove. Although he was not able to ſuſpect the teſtimony of conſcientiouſneſs, yet he thought the teſtimony of ſenſe, of memory, and of every other faculty, might be ſuſpected, and ought not to be received until proof was brought that they are not fallacious. Therefore he applies theſe faculties, whoſe character is yet in queſtion, to prove, that there is an infinitely perfect Being, who made him, and who made his ſenſes, his memory, his reaſon, and all his faculties; that this Being is no deceiver, and therefore could not give him faculties that are fallacious; and that on this account they deſerve credit.

It is ſtrange that this philoſopher, who found himſelf under a neceſſity of yielding to the teſtimony of conſciouſneſs, did not find the ſame neceſſity of yielding to the teſtimony of his ſenſes, his memory, and his underſtanding; and that, while he was certain that he doubted and reaſoned, he was uncertain whether two and three made five, and whether he was dreaming or

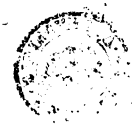
awake. It is more ſtrange that ſo acute a reaſoner ſhould not perceive that his whole train of reaſoning, to prove that his faculties were not fallacious, was mere ſophiſtry; for if his faculties were fallacious, they might deceive him in this train of reaſoning; and ſo the concluſion, that they were not fallacious, was the only teſtimony of his faculties in their own favour, and might be a fallacy.

It is difficult to give any reaſon for diſtruſting our other faculties that will not reach conſciouſneſs itſelf. And he who diſtruſts the faculties of judging and reaſoning which God hath given him muſt even reſt in his ſcepticiſm till he come to a ſound mind, or until God give him new faculties to ſit in judgment upon the old. If it be not a firſt principle, that our faculties are not fallacious, we muſt be abſolute ſceptics; for this principle is incapable of a proof, and, if it is not certain, nothing elſe can be certain.

Since the time of Des Cartes, it has been faſhionable with thoſe who dealt in abſtract philoſophy to employ their invention in finding philoſophical arguments, either to prove thoſe truths which ought to be received as firſt principles, or to overturn them; and it is not eaſy to ſay, whether the authority of firſt principles is more hurt by the firſt of theſe attempts, or by the laſt: for ſuch principles can ſtand ſecure only upon their own bottom; and to place them upon any other foundation than that of their intrinſic evidence, is in effect to overturn them.

I have lately met with a very ſenſible and judicious treatiſe, written by Father Buffier about fifty years ago, concerning firſt principles and the ſource of human judgments, which, with great propriety, he prefixed to his treatiſe of logic. And, indeed, I apprehend it is a ſubject of ſuch conſequence, that if inquiſitive men can be brought to the ſame unanimity in the firſt principles of the other ſciences as in

thoſe of mathematics and natural philoſophy, (and why ſhould we deſpair of a general agreement in things that are ſelf-evident?), this might be conſidered as a third grand era in the progreſs of human reaſon.



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